

3-MODE 200mA LDO REGULATOR

NO.EA-083-0511

OUTLINE

The R1160x Series consist of CMOS-based voltage regulator ICs with high output voltage accuracy, low supply current, and low ON-resistance. Each of these voltage regulator ICs consists of a voltage reference unit, an error amplifier, resistors for setting Output Voltage, a current limit circuit, and a chip enable circuit.

These ICs perform with low dropout voltage and a chip enable function. To prevent the destruction by over current, current limit circuit is included. The R1160x Series have 3-mode. One is standby mode with CE or standby control pin. Other two modes are realized with ECO pin™. Fast Transient Mode (FT mode) and Low Power Mode (LP mode) are alternative with ECO pin™. Consumption current is reduced to 1/10 at Low Power Mode compared with Fast Transient Mode. Output voltage is maintained between FT mode and LP mode.

The output voltage of these ICs is internally fixed with high accuracy. Since the packages for these ICs are SOT-23-5 and SON-6 packages, high density mounting of the ICs on boards is possible.

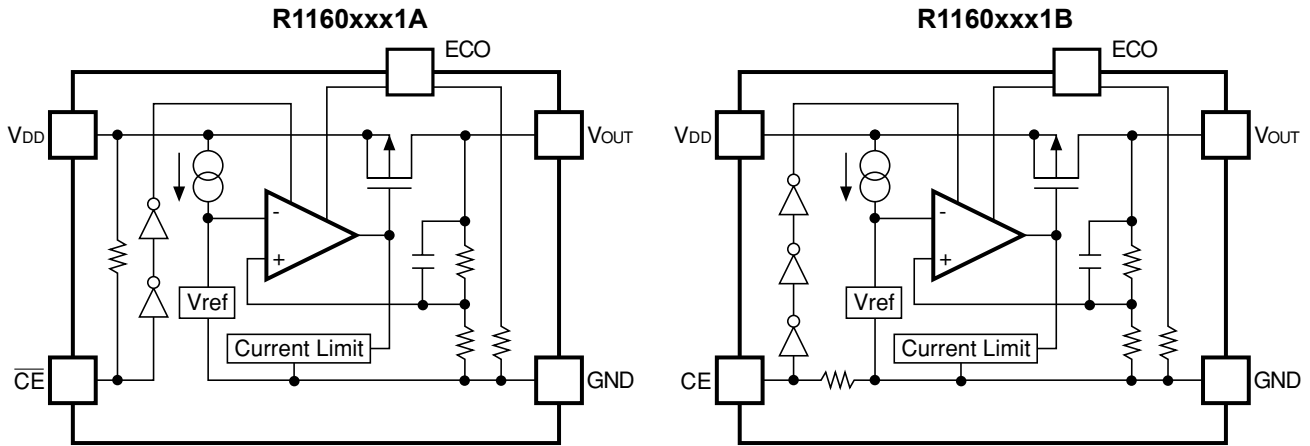
FEATURES

- Ultra-Low Supply Current Typ. 3.5 μ A (Low Power Mode, $V_{OUT} \leq 1.5V$)
Typ. 40 μ A (Fast Transient Mode)
- Standby Mode Typ. 0.1 μ A
- Low Dropout Voltage Typ. 0.30V ($I_{OUT}=200mA$ 3.0V Output Voltage=1.0V Type)
Typ. 0.20V ($I_{OUT}=200mA$ 3.0V Output Voltage=1.5V Type)
Typ. 0.14V ($I_{OUT}=200mA$ 3.0V Output Voltage=3.0V Type)
- High Ripple Rejection Typ. 70dB (f=1kHz, FT Mode)
- Low Temperature-Drift Coefficient of Output Voltage Typ. $\pm 100ppm/^{\circ}C$
- Excellent Line Regulation Typ. 0.05%/V
- High Output Voltage Accuracy $\pm 2.0%$ ($\pm 3.0%$ at LP Mode)
- Output Voltage Stepwise setting with a step of 0.1V in the range of
0.8V to 3.3V is possible
- Input Voltage Min. 1.4V
- Built-in Fold Back Protection Circuit Typ. 50mA (Current at short mode)
- Small Packages SOT-23-5 (Super Mini-mold), SON-6

APPLICATIONS

- Precision Voltage References.
- Power source for electrical appliances such as cameras, VCRs and hand-held communication equipment.
- Power source for battery-powered equipment.

BLOCK DIAGRAMS



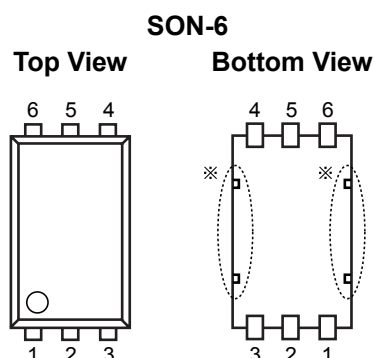
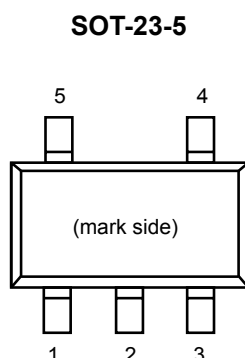
SELECTION GUIDE

The output voltage, chip enable polarity, and the taping type for the ICs can be selected at the user's request. The selection can be available by designating the part number as shown below;

R1160xxx1x-xx ←Part Number
 ↑ ↑ ↑ ↑
 a b c d

Code	Contents
a	Designation of Package Type : N: SOT-23-5 (Mini mold) D: SON-6
b	Setting Output Voltage (V _{OUT}) : Stepwise setting with a step of 0.1V in the range of 0.8V to 3.3V is possible.
c	Designation of Chip Enable Option : A : "L" active type. B : "H" active type.
d	Designation of Taping Type : Refer to Taping Specifications; TR type is the standard direction.

PIN CONFIGURATION



PIN DESCRIPTIONS

• SOT-23-5

Pin No	Symbol	Pin Description
1	V_{DD}	Input Pin
2	GND	Ground Pin
3	\overline{CE} or CE	Chip Enable Pin
4	ECO	MODE alternative pin
5	V_{OUT}	Output pin

SON-6

Pin No	Symbol	Pin Description
1	V_{DD}	Input Pin
2	NC	No Connection
3	V_{OUT}	Output pin
4	ECO	MODE alternative pin
5	GND	Ground Pin
6	\overline{CE} or CE	Chip Enable Pin

* Tab in the parts have GND level.
(They are connected to the reverse side of this IC.)
Do not connect to other wires or land patterns.

ABSOLUTE MAXIMUM RATINGS

Symbol	Item	Rating	Unit
V_{IN}	Input Voltage	6.5	V
V_{ECO}	Input Voltage (ECO Pin)	6.5	V
V_{CE}	Input Voltage (\overline{CE} or CE Pin)	6.5	V
V_{OUT}	Output Voltage	$-0.3 \sim V_{IN}+0.3$	V
I_{OUT}	Output Current	250	mA
P_D	Power Dissipation (SOT-23-5)*	420	mW
	Power Dissipation (SON-6)*	500	mW
T_{opt}	Operating Temperature Range	$-40 \sim 85$	$^{\circ}\text{C}$
T_{stg}	Storage Temperature Range	$-55 \sim 125$	$^{\circ}\text{C}$

*) For Power Dissipation, please refer to PACKAGE INFORMATION to be described.

ELECTRICAL CHARACTERISTICS

• R1160xxx1A

T_{opt}=25°C

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
V _{OUT}	Output Voltage	V _{IN} =Set V _{OUT} +1V, V _{ECO} =V _{IN} 1μA ≤ I _{OUT} ≤ 30mA *1	×0.980 (-30mV)		×1.020 (30mV)	V
		V _{IN} =Set V _{OUT} +1V, V _{ECO} =GND 1μA ≤ I _{OUT} ≤ 30mA *2	×0.970 (-45mV)		×1.030 (45mV)	V
I _{OUT}	Output Current	V _{IN} -V _{OUT} =0.5V V _{IN} ≥ 1.5V, V _{OUT} ≤ 1.0V	200			mA
ΔV _{OUT} /ΔI _{OUT}	Load Regulation(FT Mode)	V _{IN} =Set V _{OUT} +1V, V _{ECO} =V _{IN} 1mA ≤ I _{OUT} ≤ 200mA		20	40	mV
	Load Regulation(LP Mode)	V _{IN} =Set V _{OUT} +1V, V _{ECO} =GND 1mA ≤ I _{OUT} ≤ 100mA		10	40	mV
V _{DIF}	Dropout Voltage	Refer to the ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE				
I _{SS1}	Supply Current (FT Mode)	V _{IN} =Set V _{OUT} +1V V _{ECO} =V _{IN} , I _{OUT} =0mA		40	70	μA
I _{SS2}	Supply Current (LP Mode)	V _{IN} =Set V _{OUT} +1V, I _{OUT} =0mA V _{OUT} ≤ 1.5V, V _{ECO} =GND		3.5	6.0	μA
		V _{IN} =Set V _{OUT} +1V, I _{OUT} =0mA V _{OUT} ≥ 1.6V, V _{ECO} =GND		4.5	8.0	μA
I _{standby}	Supply Current (Standby)	V _{IN} =V _{CE} =Set V _{OUT} +1V V _{ECO} =GND		0.1	1.0	μA
ΔV _{OUT} /ΔV _{IN}	Line Regulation (FT Mode)	Set V _{OUT} +0.5V ≤ V _{IN} ≤ 6.0V I _{OUT} =30mA, V _{ECO} =V _{IN} ,		0.05	0.20	%/V
	Line Regulation (LP Mode)	Set V _{OUT} +0.5V ≤ V _{IN} ≤ 6.0V I _{OUT} =30mA, V _{ECO} =GND		0.10	0.30	%/V
RR	Ripple Rejection (FT Mode)	f=1kHz, Ripple 0.2Vp-p V _{IN} =Set V _{OUT} +1V I _{OUT} =30mA, V _{ECO} =V _{IN}		70		dB
V _{IN}	Input Voltage		1.4		6.0	V
ΔV _{OUT} /ΔT _{opt}	Output Voltage Temperature Coefficient	I _{OUT} =30mA -40°C ≤ T _{opt} ≤ 85°C		±100		ppm/°C
I _{lim}	Short Current Limit	V _{OUT} =0V		50		mA
R _{PU}	$\overline{\text{CE}}$ Pull-up Resistance		2.0	5.0	14.0	MΩ
R _{PD}	ECO Pull-down Resistance		1.5	5.0	14.0	MΩ
V _{CEH}	$\overline{\text{CE}}$, ECO Input Voltage "H"		1.0		6.0	V
V _{CEL}	$\overline{\text{CE}}$, ECO Input Voltage "L"		0.0		0.3	V

*1 : ±30mV Tolerance for V_{OUT} ≤ 1.5V*2 : ±45mV Tolerance for V_{OUT} ≤ 1.5V

● R1160xxx1B

T_{opt}=25°C

Symbol	Item	Conditions	Min.	Typ.	Max.	Unit
V _{OUT}	Output Voltage	V _{IN} =Set V _{OUT} +1V, V _{ECO} =V _{IN} 1μA ≤ I _{OUT} ≤ 30mA *1	×0.980 (-30mV)		×1.020 (30mV)	V
		V _{IN} =Set V _{OUT} +1V, V _{ECO} =GND 1μA ≤ I _{OUT} ≤ 30mA *2	×0.970 (-45mV)		×1.030 (45mV)	V
I _{OUT}	Output Current	V _{IN} -V _{OUT} =0.5V V _{IN} ≥ 1.5V, V _{OUT} ≤ 1.0V	200			mA
ΔV _{OUT} /ΔI _{OUT}	Load Regulation(FT Mode)	V _{IN} =Set V _{OUT} +1V, V _{ECO} =V _{IN} 1mA ≤ I _{OUT} ≤ 200mA		20	40	mV
	Load Regulation(LP Mode)	V _{IN} =Set V _{OUT} +1V, V _{ECO} =GND 1mA ≤ I _{OUT} ≤ 100mA		10	40	mV
V _{DIF}	Dropout Voltage	Refer to the ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE				
I _{SS1}	Supply Current (FT Mode)	V _{IN} =Set V _{OUT} +1V V _{ECO} =V _{IN} , I _{OUT} =0mA		40	70	μA
I _{SS2}	Supply Current (LP Mode)	V _{IN} =Set V _{OUT} +1V, I _{OUT} =0mA V _{OUT} ≤ 1.5V, V _{ECO} =GND		3.5	6.0	μA
		V _{IN} =Set V _{OUT} +1V, I _{OUT} =0mA V _{OUT} ≥ 1.6V, V _{ECO} =GND		4.5	8.0	μA
I _{standby}	Supply Current (Standby)	V _{IN} =Set V _{OUT} +1V V _{CE} =GND, V _{ECO} =GND		0.1	1.0	μA
ΔV _{OUT} /ΔV _{IN}	Line Regulation (FT Mode)	Set V _{OUT} +0.5V ≤ V _{IN} ≤ 6.0V I _{OUT} =30mA, V _{ECO} =V _{IN} ,		0.05	0.20	%/V
	Line Regulation (LP Mode)	Set V _{OUT} +0.5V ≤ V _{IN} ≤ 6.0V I _{OUT} =30mA, V _{ECO} =GND		0.10	0.30	%/V
RR	Ripple Rejection (FT Mode)	f=1kHz, Ripple 0.2Vp-p V _{IN} =Set V _{OUT} +1V I _{OUT} =30mA, V _{ECO} =V _{IN}		70		dB
V _{IN}	Input Voltage		1.4		6.0	V
ΔV _{OUT} /ΔT _{opt}	Output Voltage Temperature Coefficient	I _{OUT} =30mA -40°C ≤ T _{opt} ≤ 85°C		±100		ppm/°C
I _{lim}	Short Current Limit	V _{OUT} =0V		50		mA
R _{PDC}	CE Pull-down Resistance		2.0	5.0	14.0	MΩ
R _{PDE}	ECO Pull-down Resistance		1.5	5.0	14.0	MΩ
V _{CEH}	CE,ECO Input Voltage "H"		1.0		6.0	V
V _{CEL}	CE,ECO Input Voltage "L"		0.0		0.3	V

*1 : ±30mV Tolerance for V_{OUT} ≤ 1.5V*2 : ±45mV Tolerance for V_{OUT} ≤ 1.5V

• ELECTRICAL CHARACTERISTICS by OUTPUT VOLTAGE

Top=25°C

Output Voltage V _{OUT} (V)	Dropout Voltage V _{DIF} (V)		
	Condition	Typ.	Max.
0.8 ≤ V _{OUT} < 0.9	I _{OUT} =200mA	0.40	0.70
1.0 ≤ V _{OUT} < 1.4		0.30	0.50
1.5 ≤ V _{OUT} < 2.5		0.20	0.30
2.6 ≤ V _{OUT}		0.20 (V _{ECO} ="H") 0.25 (V _{ECO} ="L")	

TEST CIRCUITS

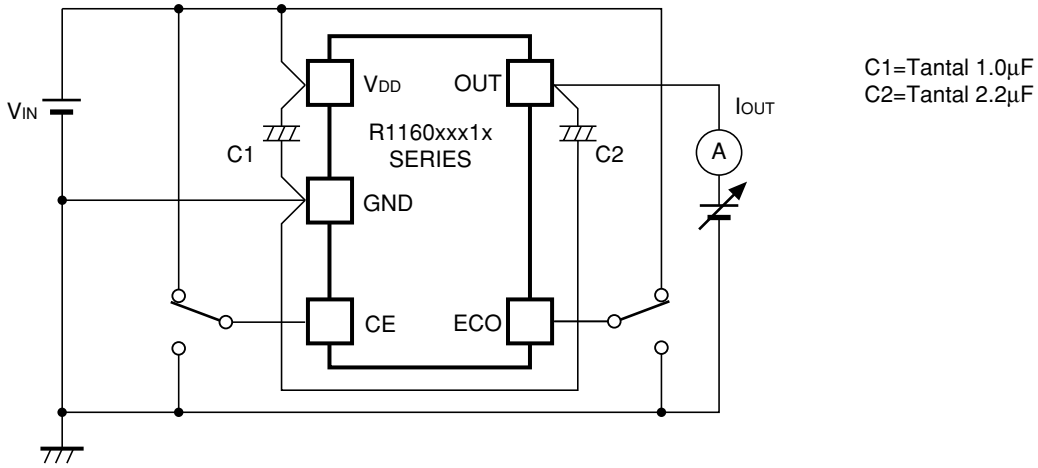


Fig.1 Output Voltage vs. Output Current Test Circuit

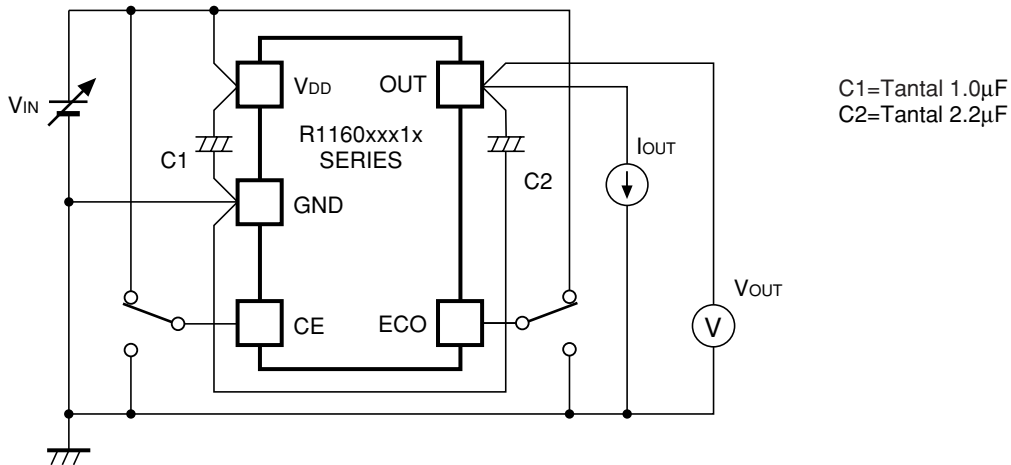


Fig.2 Output Voltage vs. Input Voltage Test Circuit

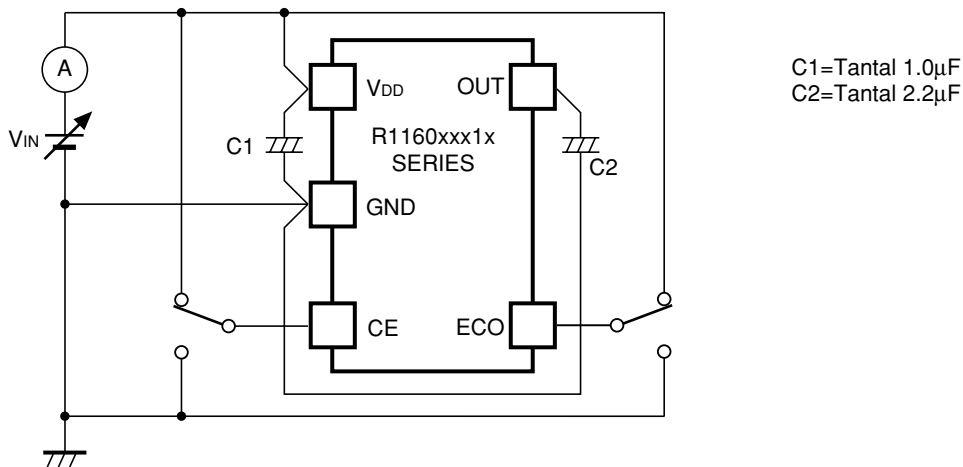


Fig.3 Supply Current vs. Input Voltage Test Circuit

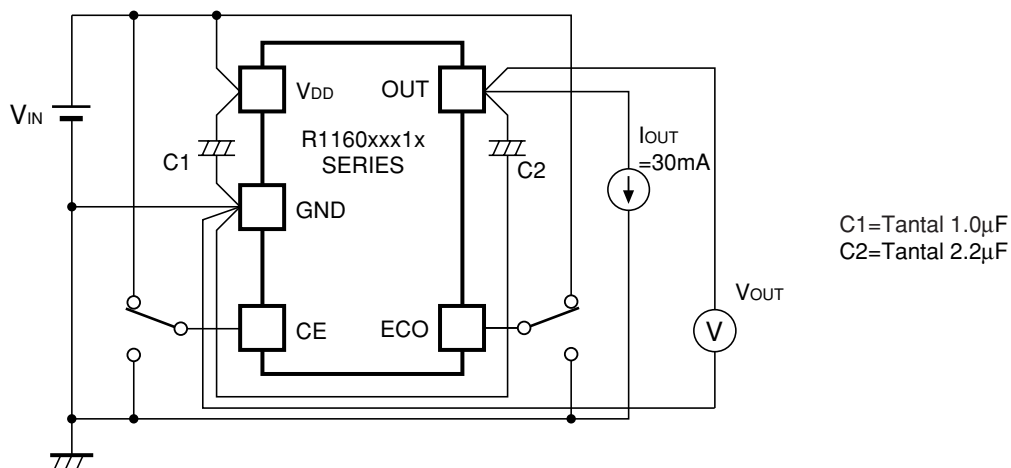


Fig.4 Output Voltage vs. Temperature Test Circuit

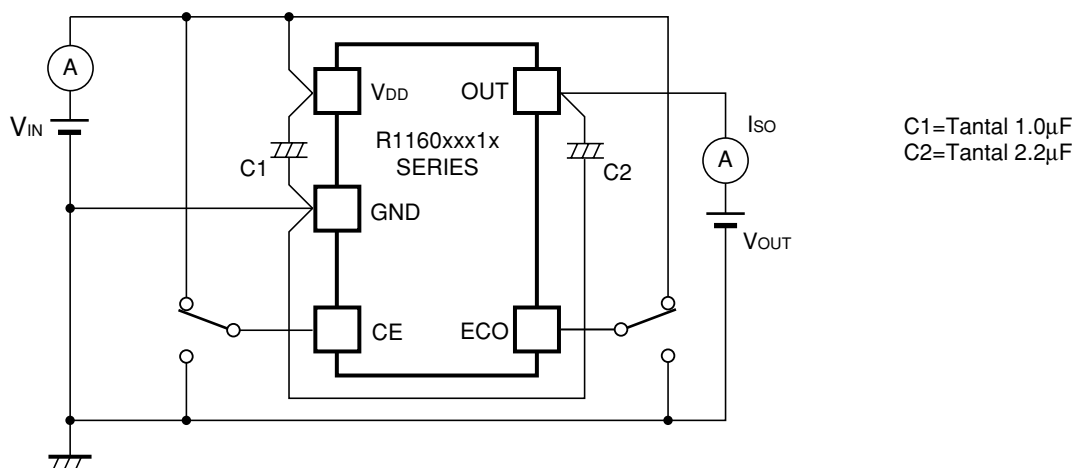


Fig.5 Supply Current vs. Temperature Test Circuit

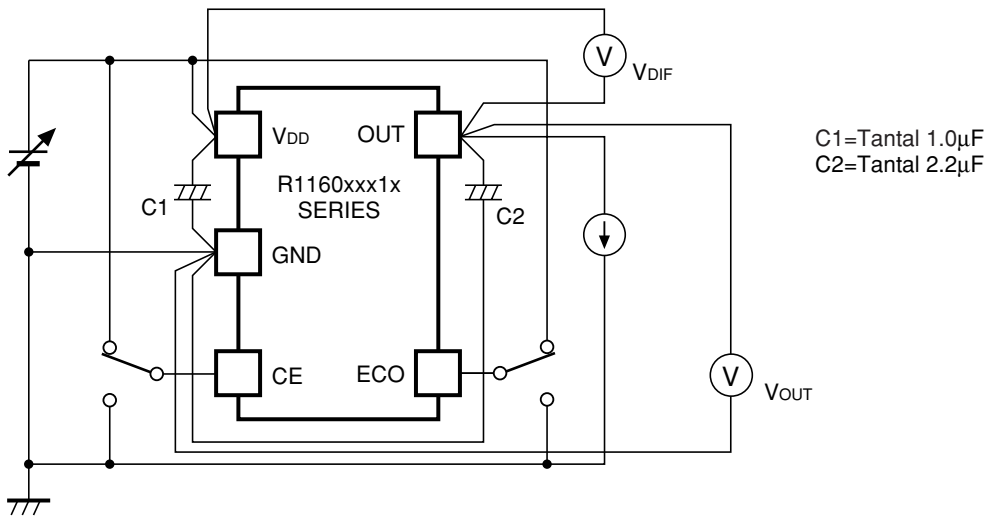


Fig. 6 Dropout Voltage vs. Output Current/ Set Output Voltage Test Circuit

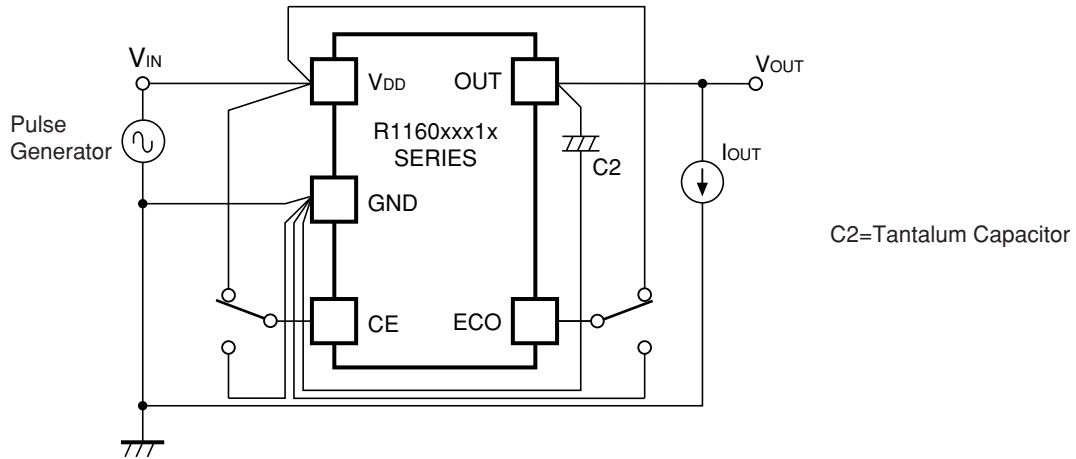


Fig. 7 Ripple Rejection Test Circuit

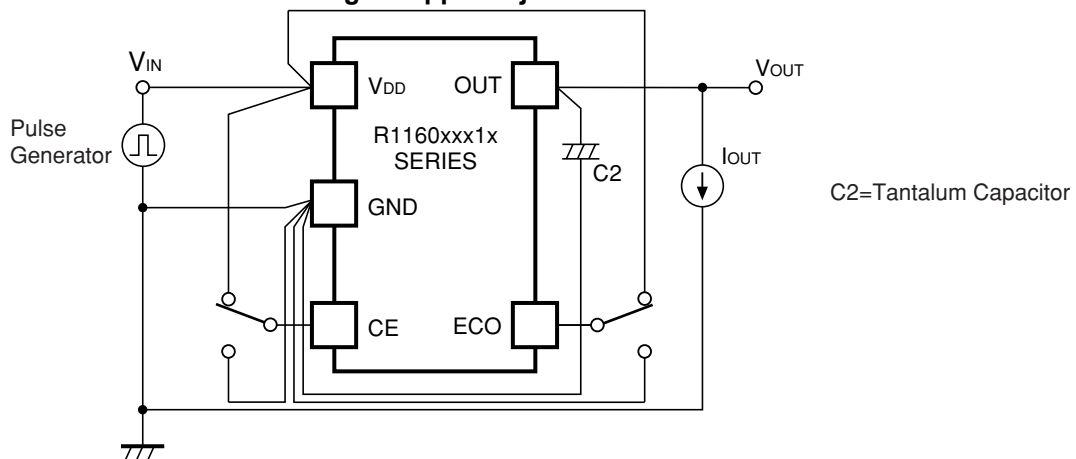


Fig.8 Input Transient Response Test Circuit

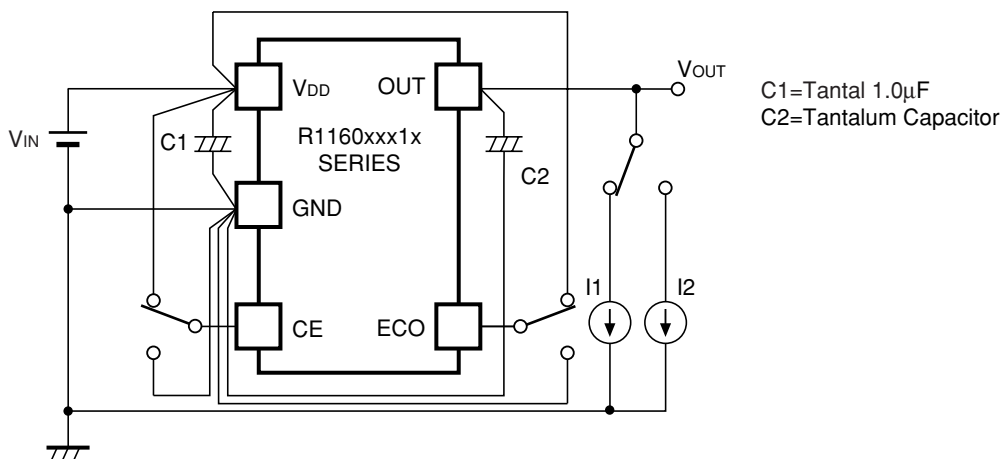


Fig.9 Load Transient Response Test Circuit

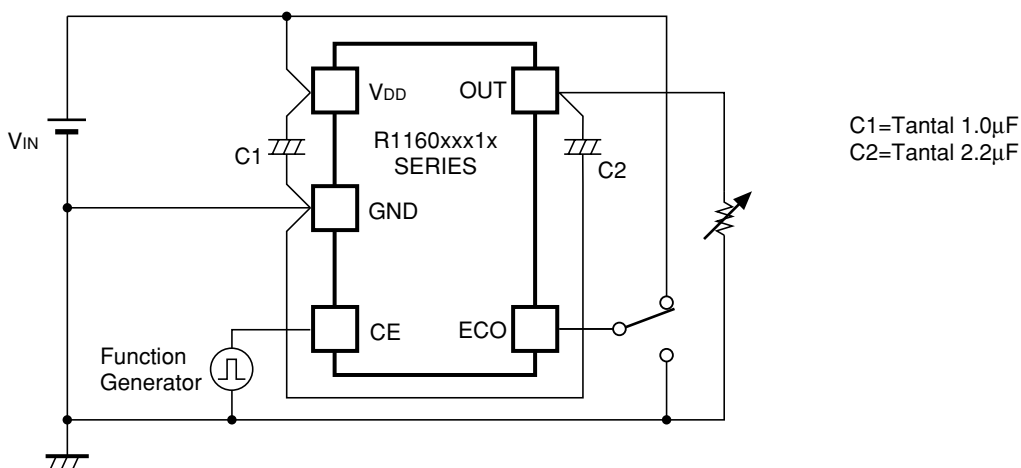


Fig.10 Turn on Speed with CE pin Test Circuit

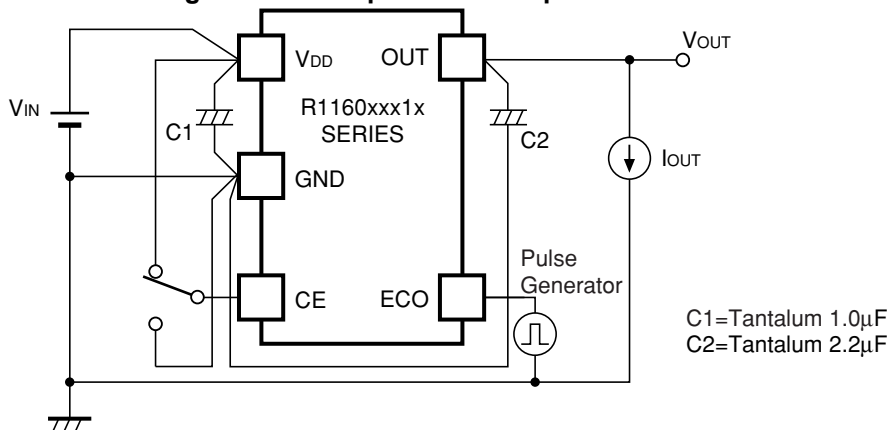


Fig.11 MODE Transient Response Test Circuit

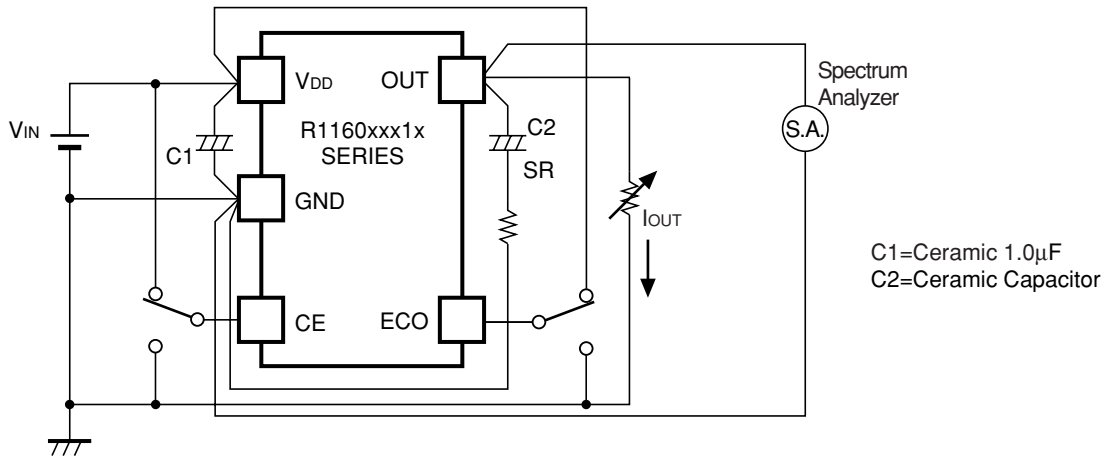
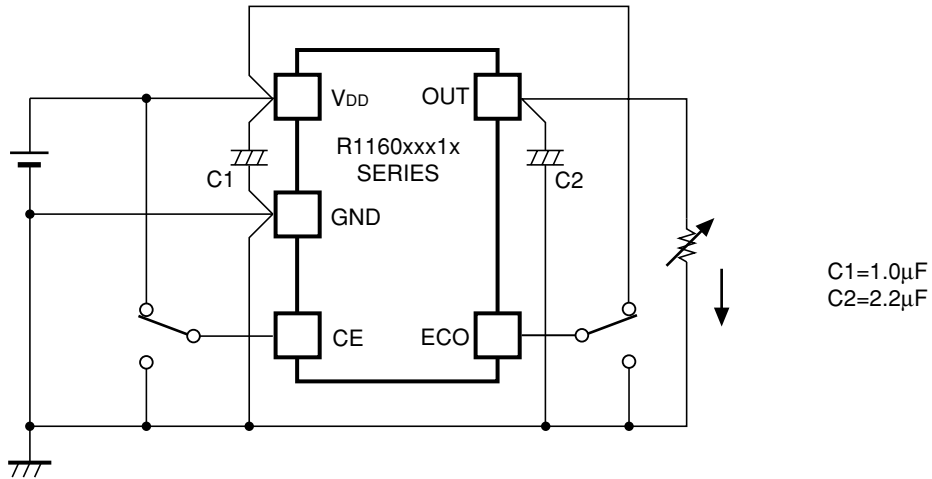


Fig.12 Output Noise Test Circuit (I_{OUT} vs. ESR)

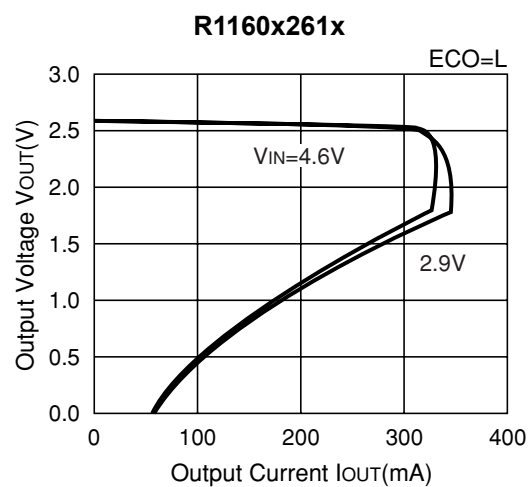
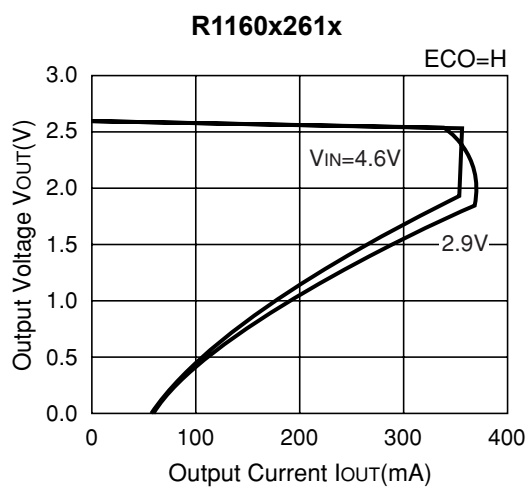
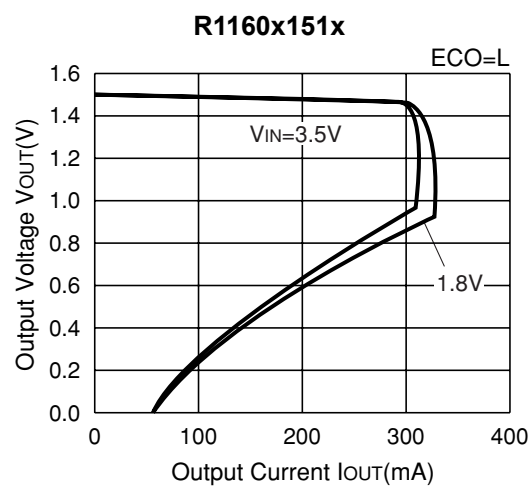
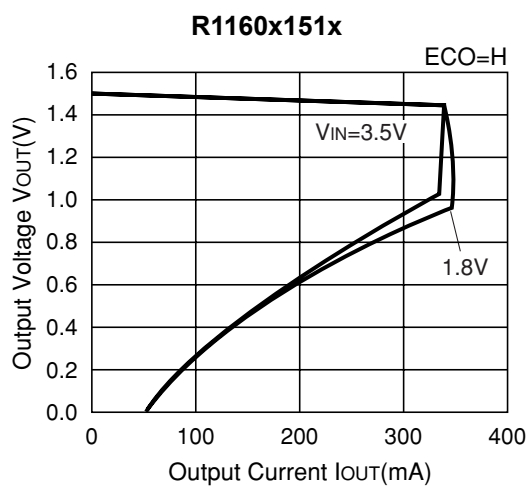
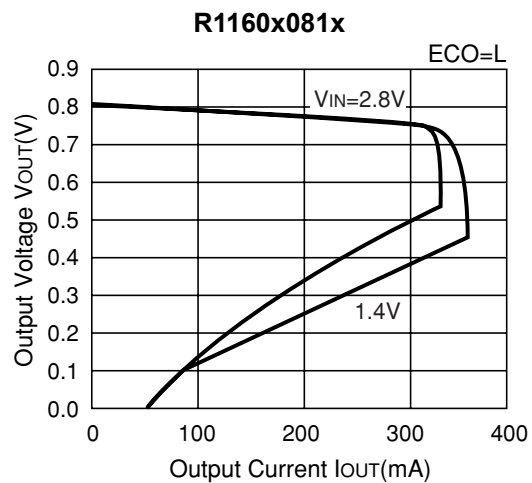
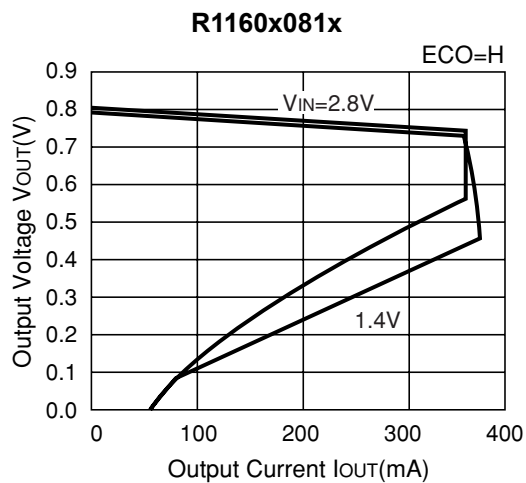
TYPICAL APPLICATION

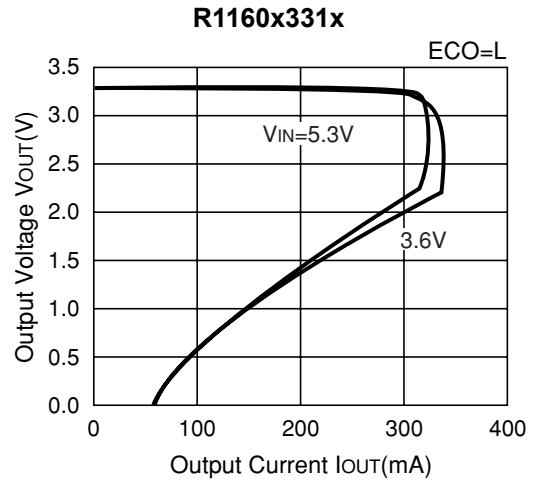
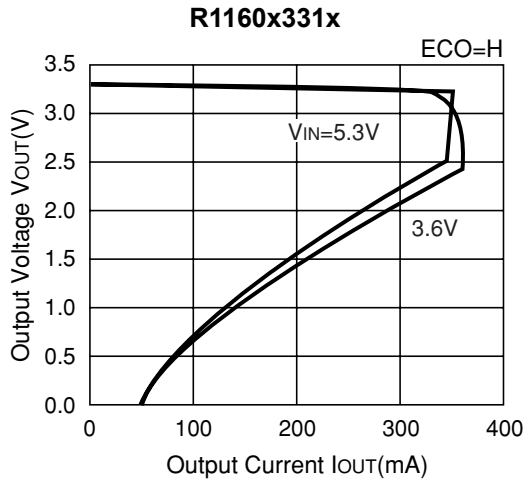


(External Components)
 Output Capacitor; Tantalum Type
 Input Capacitor; Ceramic Type

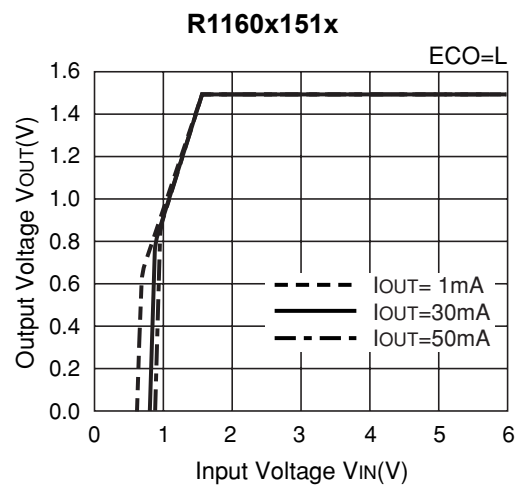
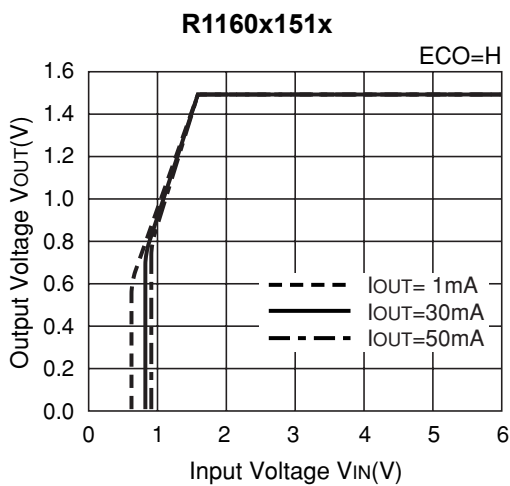
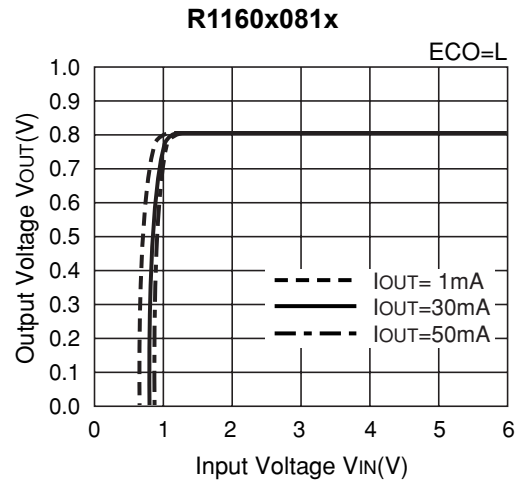
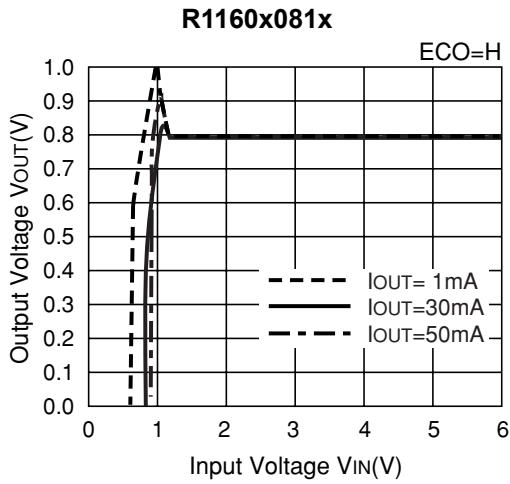
TYPICAL CHARACTERISTICS

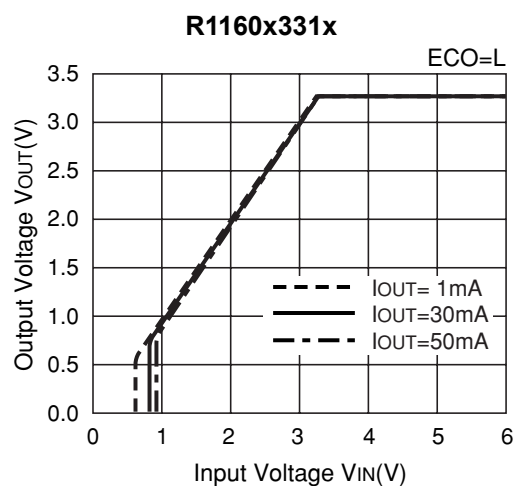
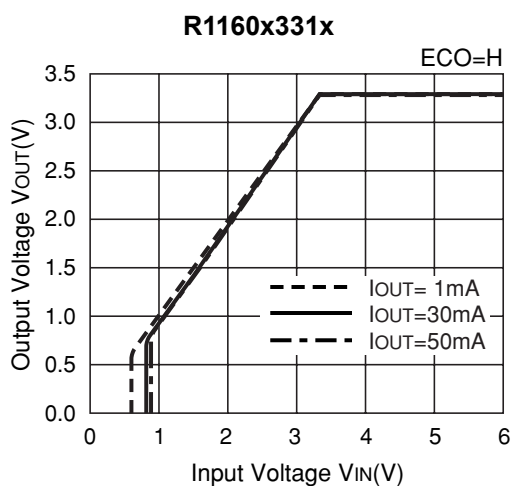
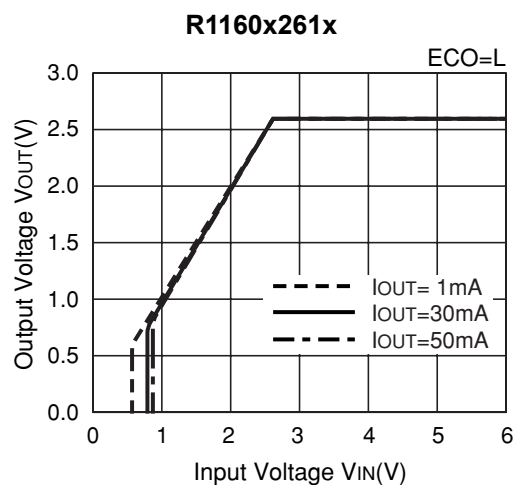
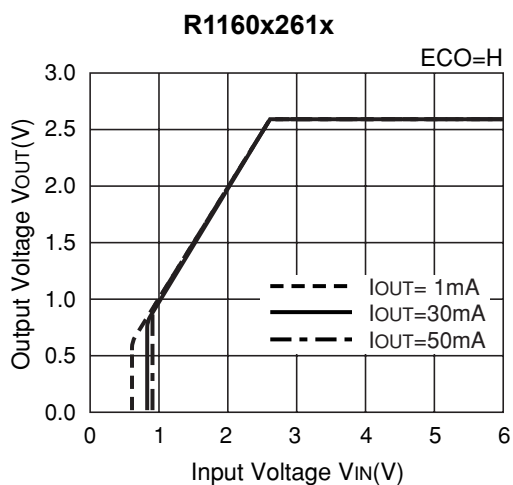
1) Output Voltage vs. Output Current



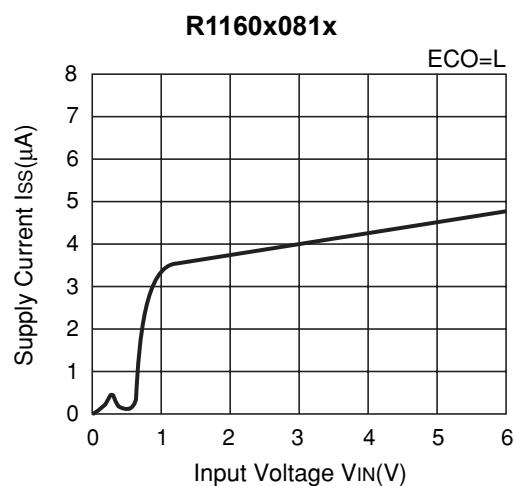
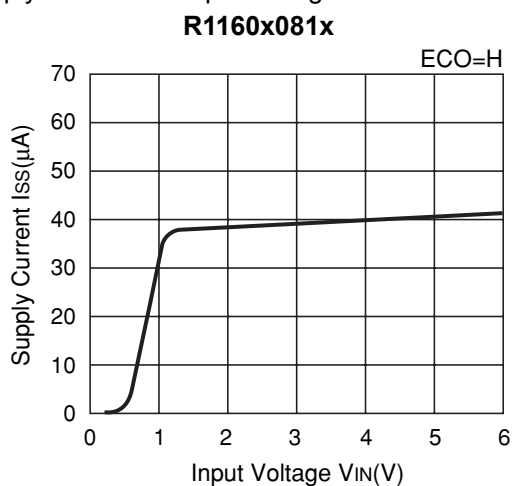


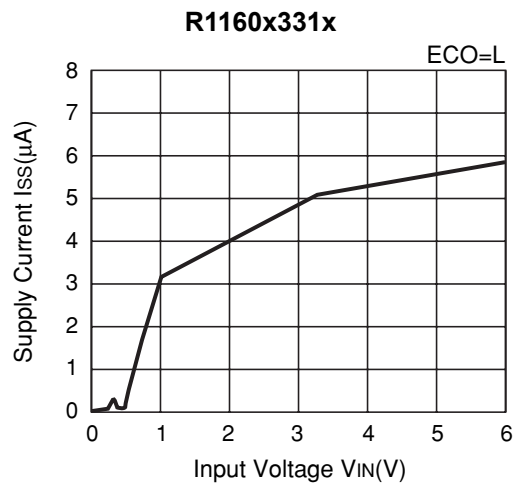
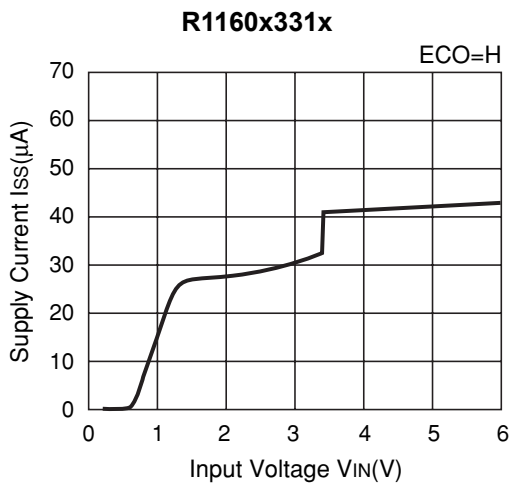
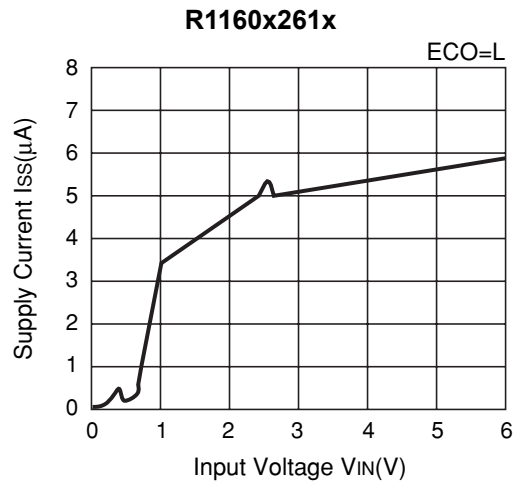
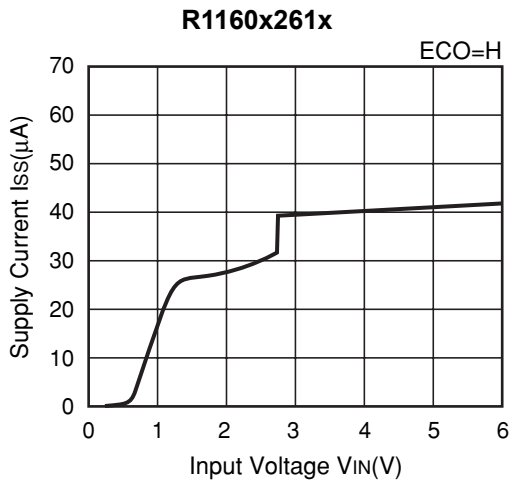
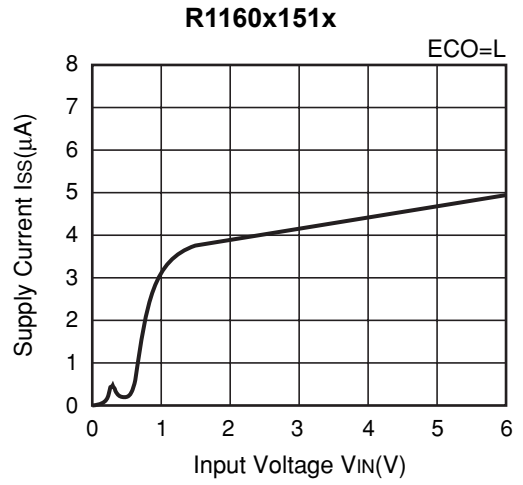
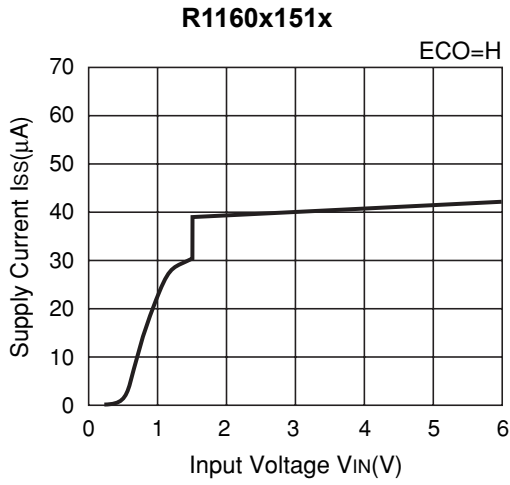
2) Output Voltage vs. Input Voltage



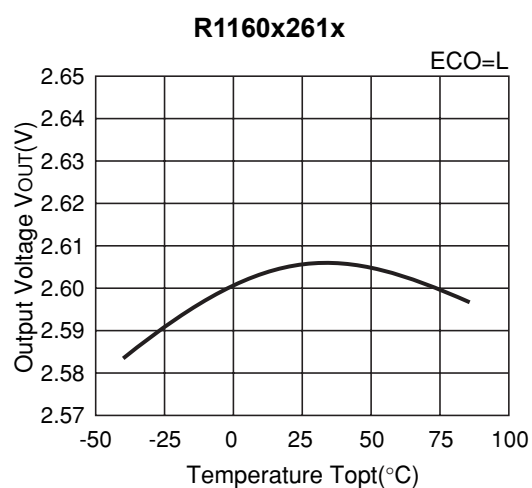
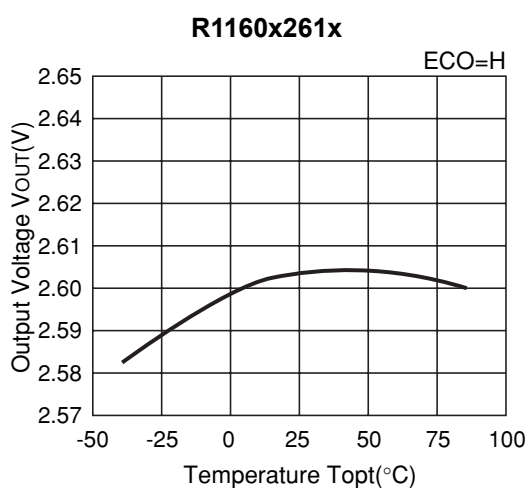
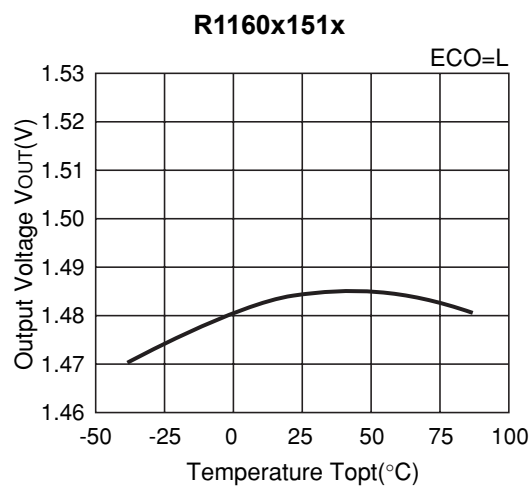
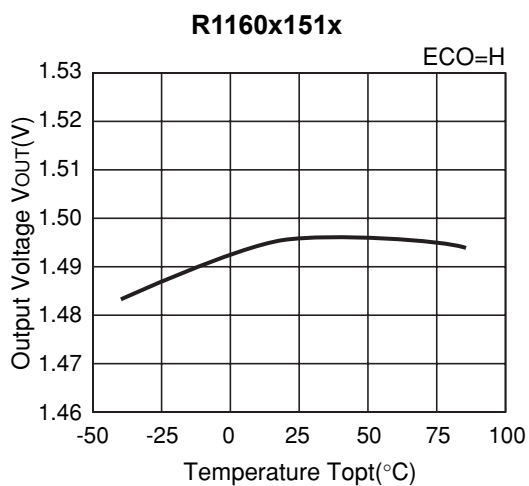
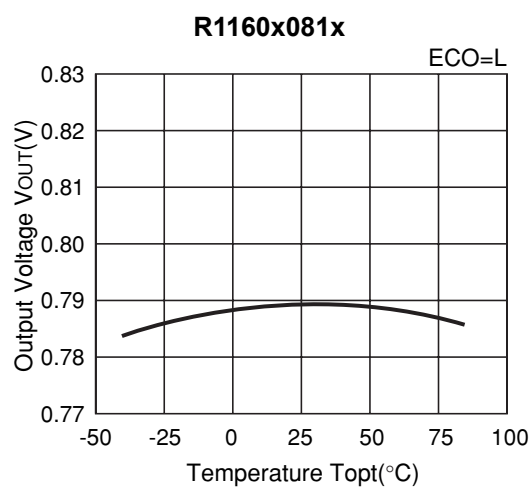
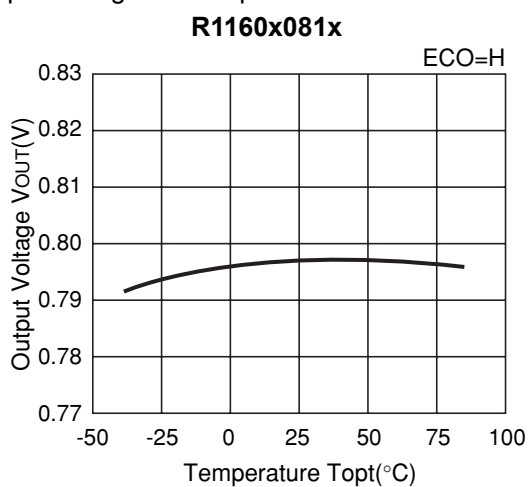


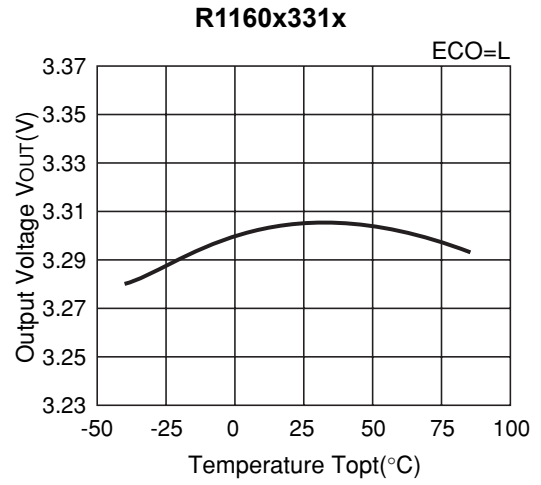
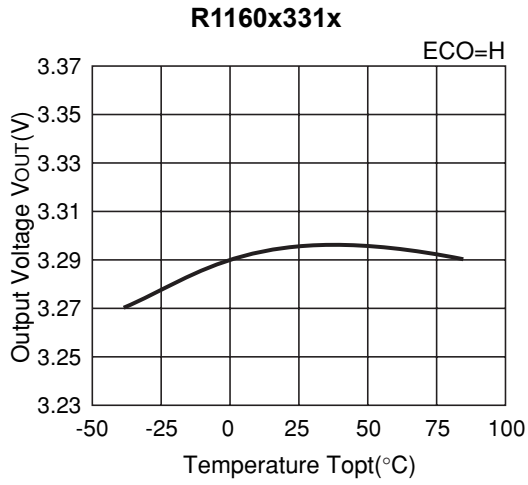
3) Supply Current vs. Input Voltage



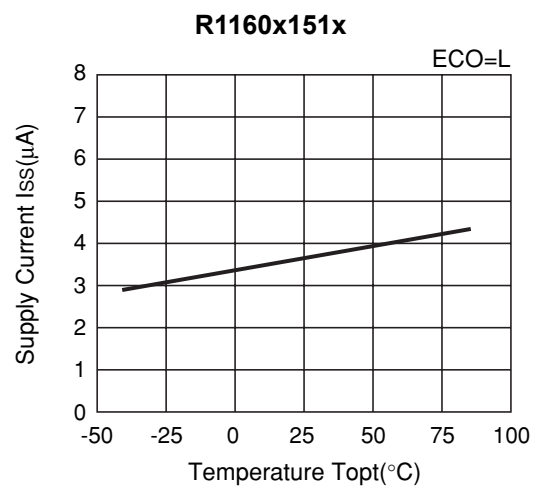
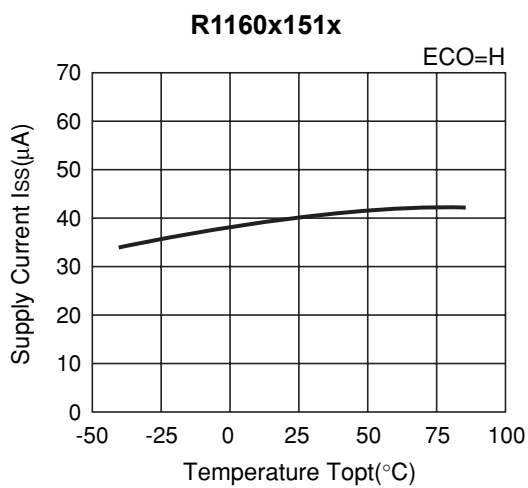
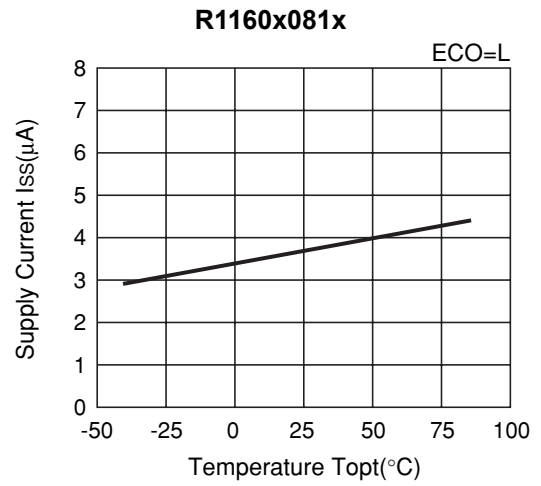
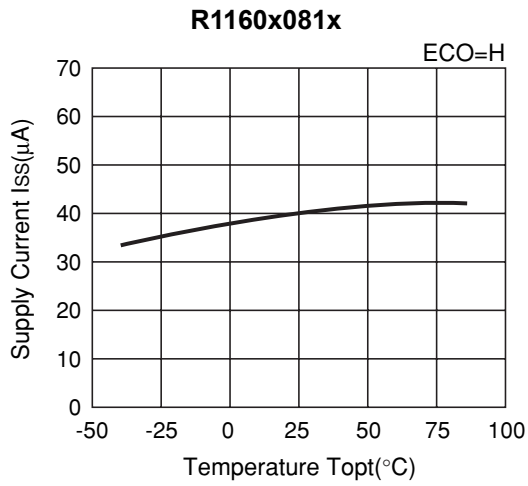


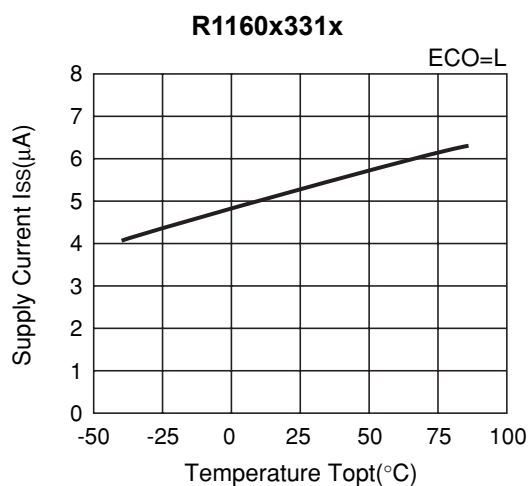
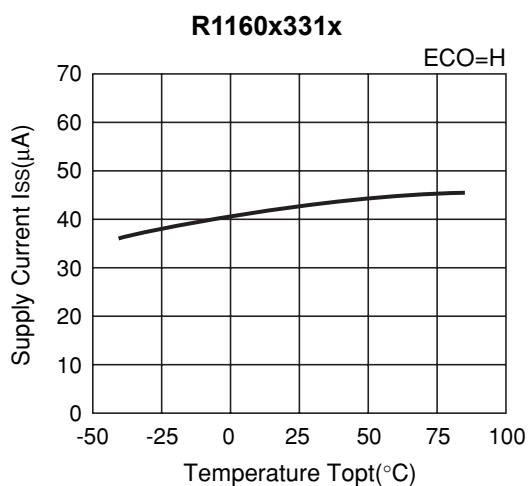
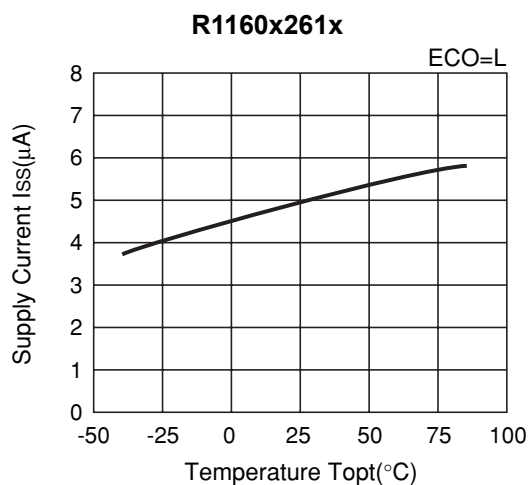
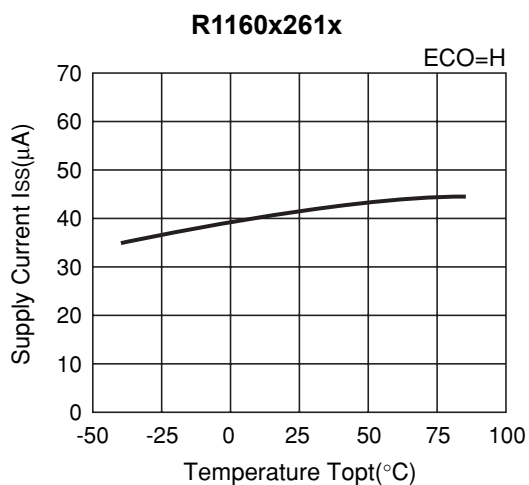
4) Output Voltage vs. Temperature



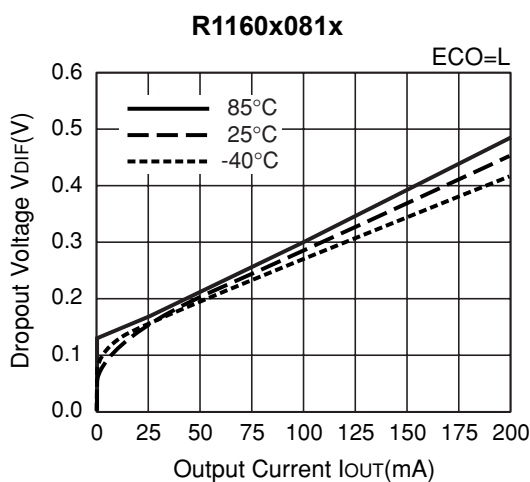
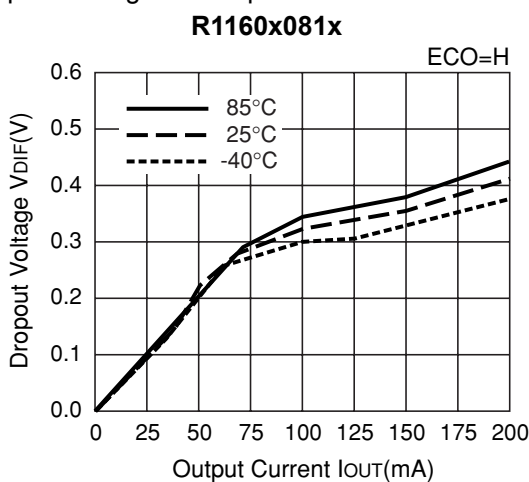


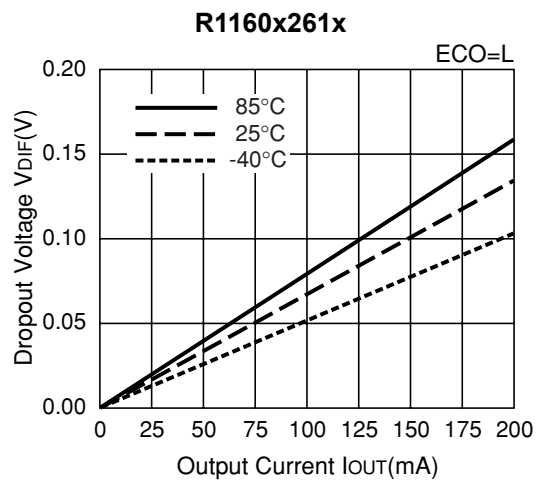
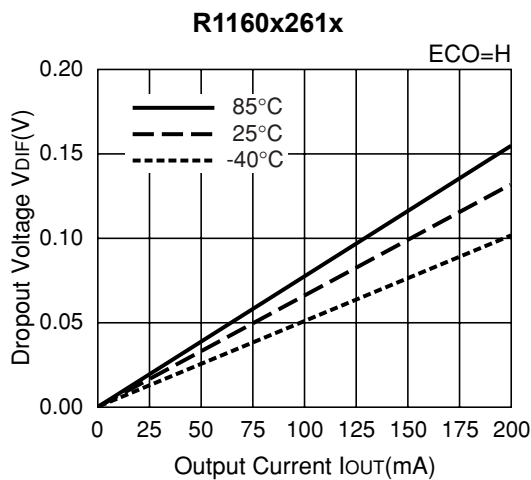
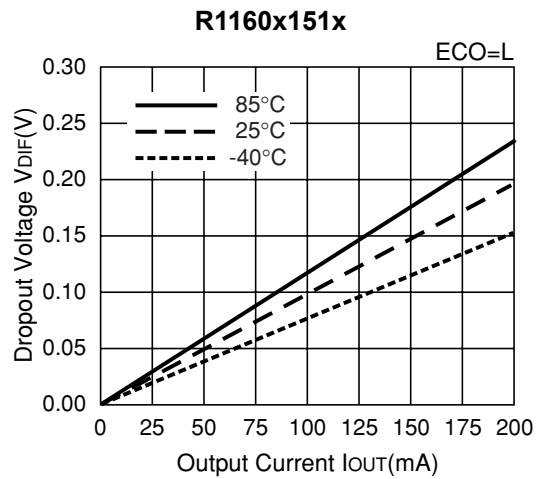
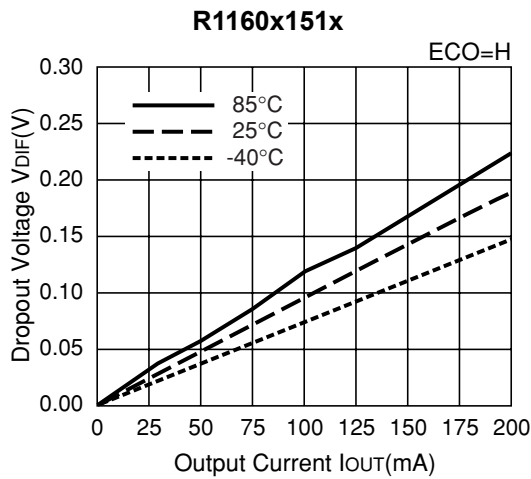
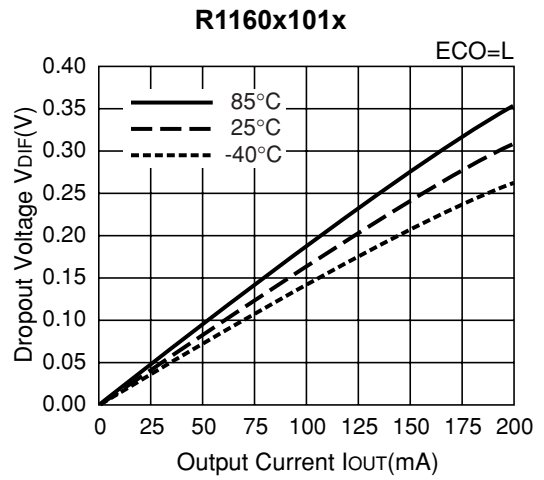
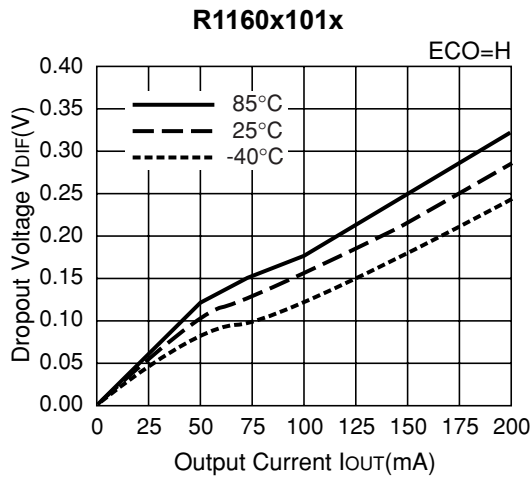
5) Supply Current vs. Input Voltage

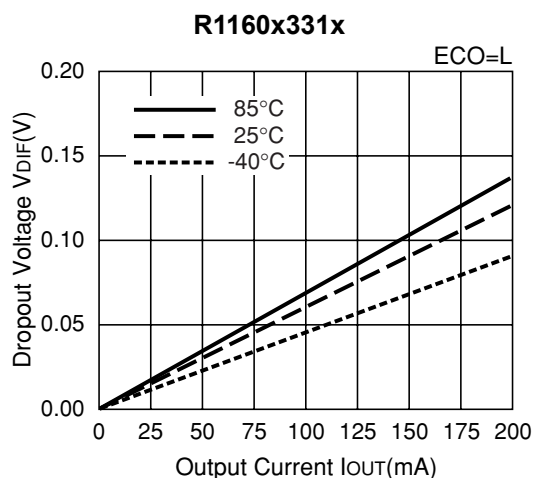
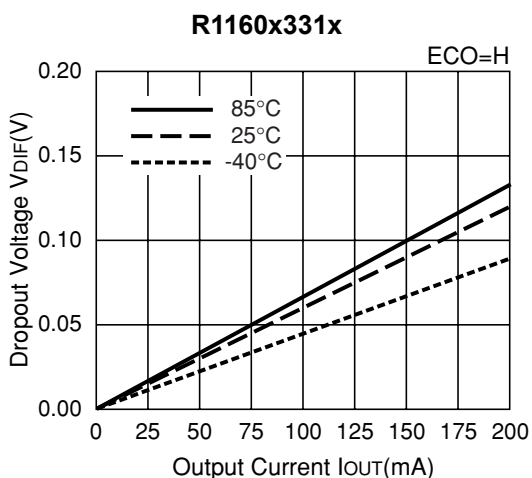




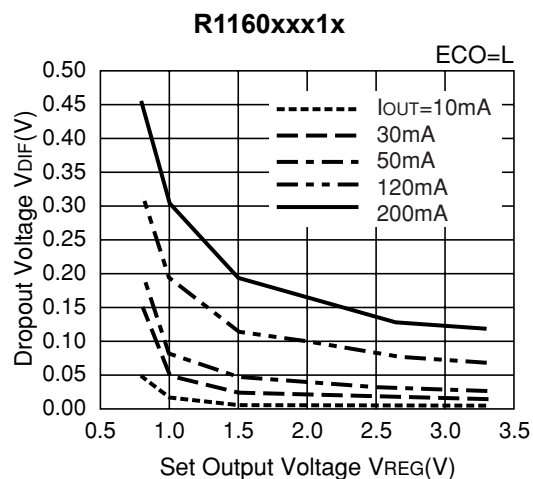
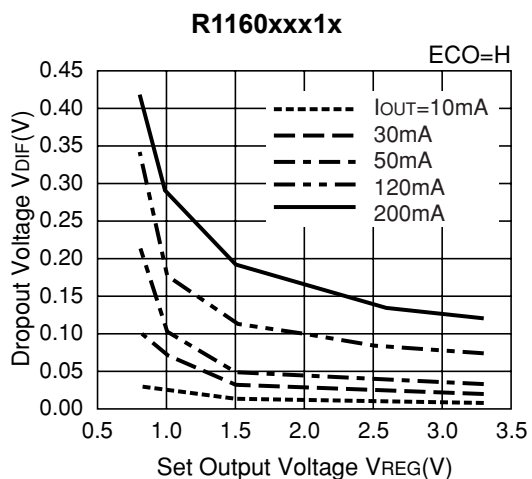
6) Dropout Voltage vs. Output Current



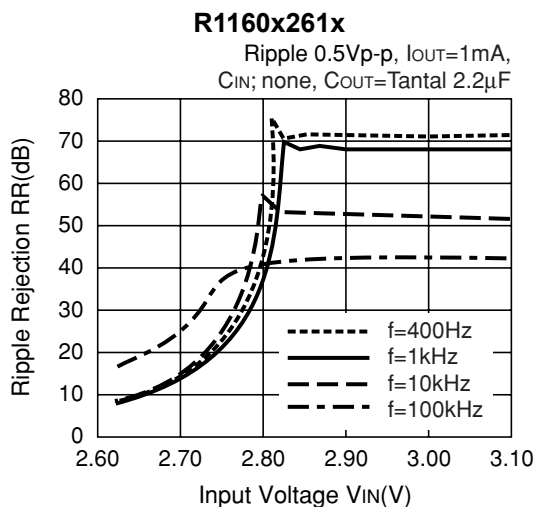
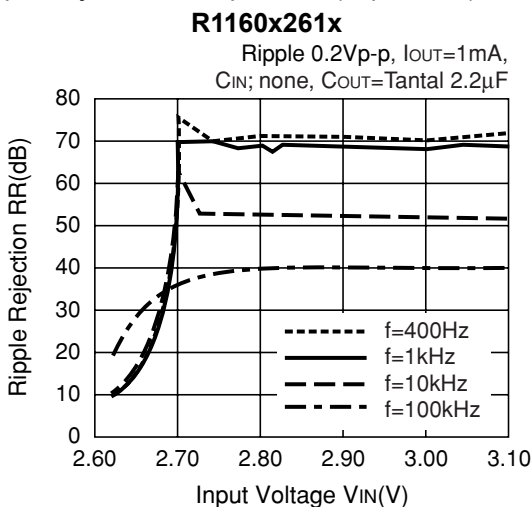


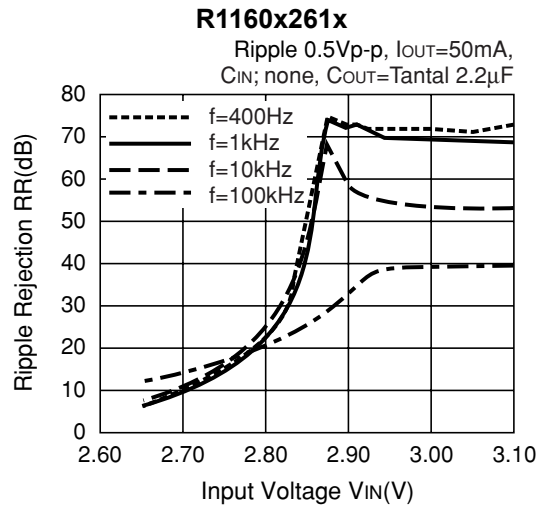
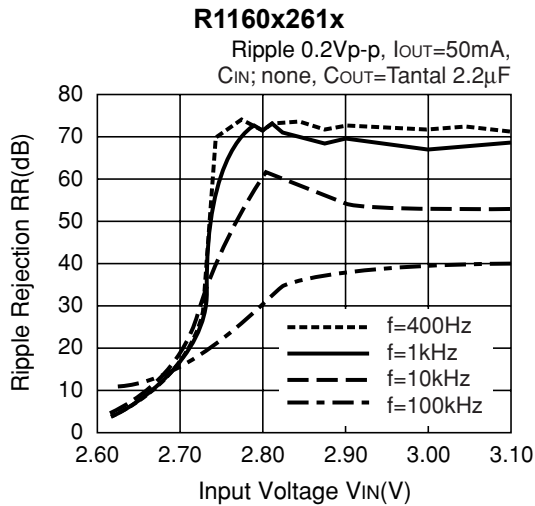
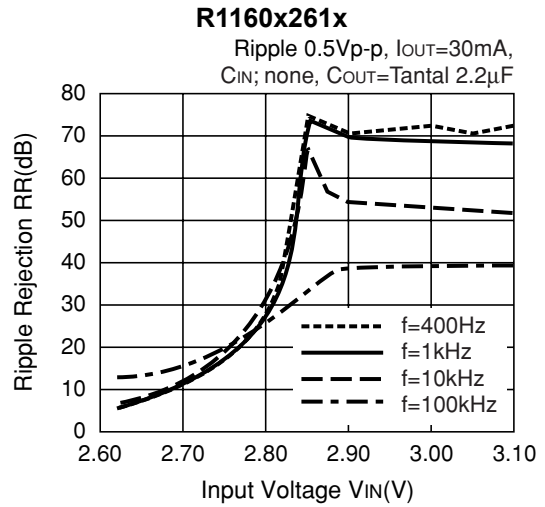
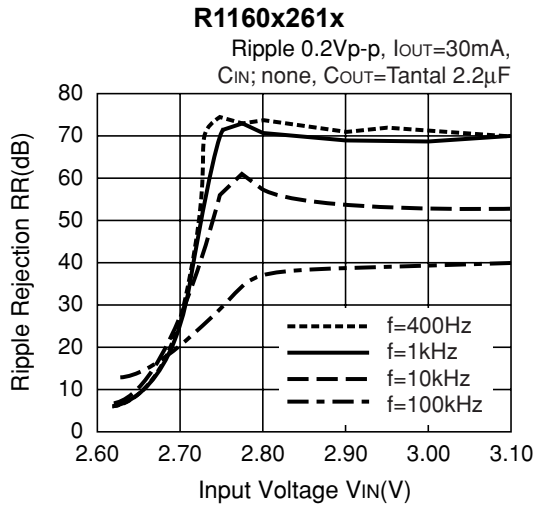


7) Dropout Voltage vs. Set Output Voltage (Topt=25°C)

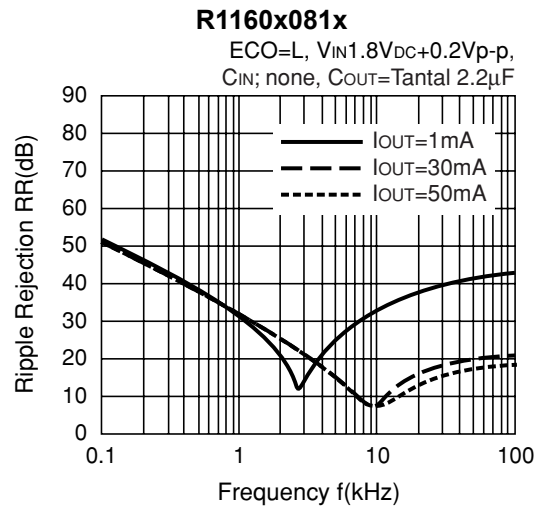
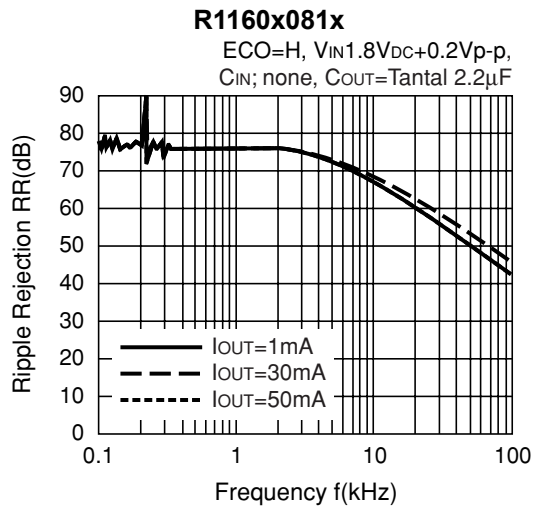


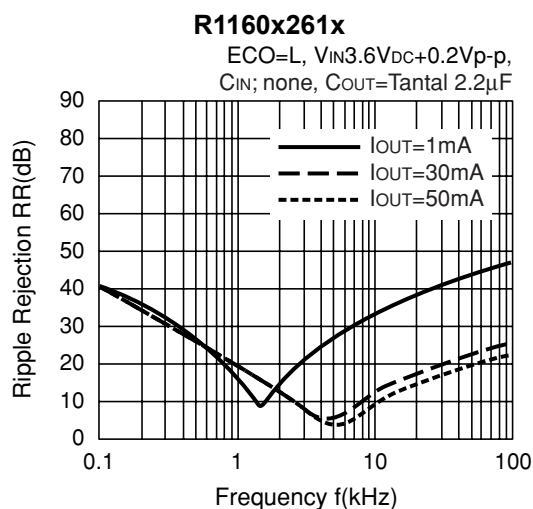
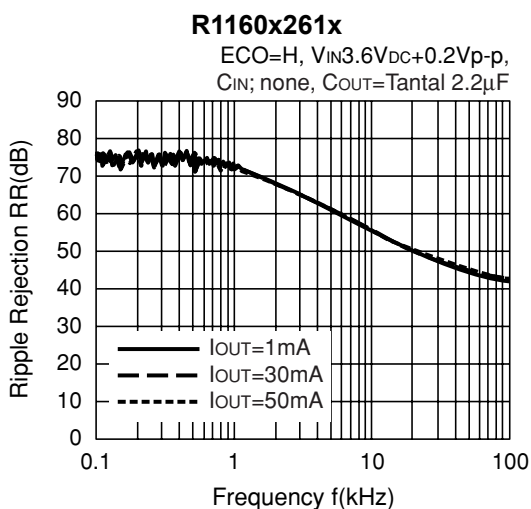
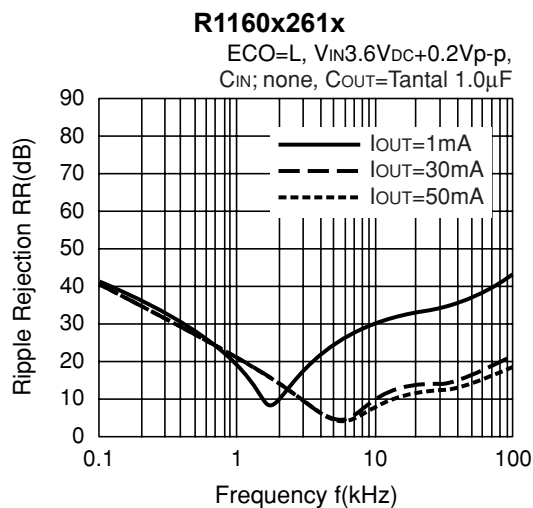
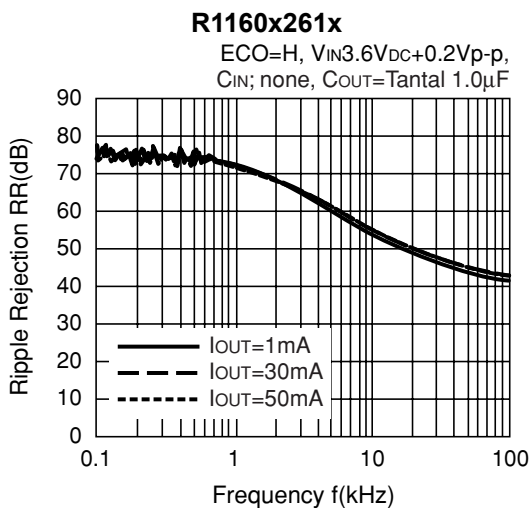
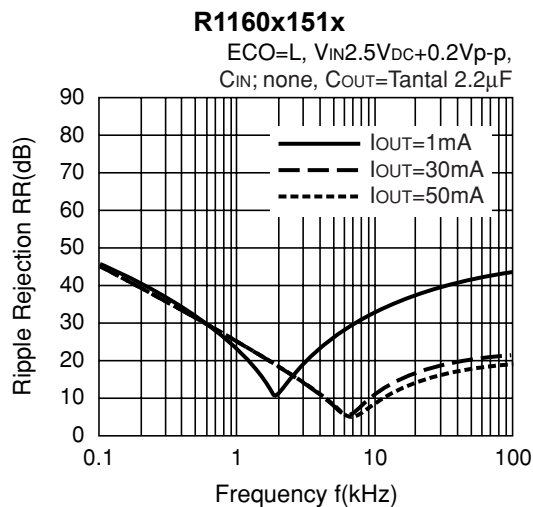
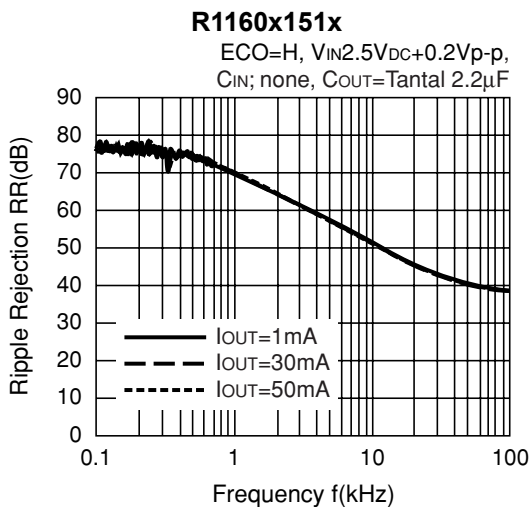
8) Ripple Rejection vs. Input Bias (Topt=25°C)

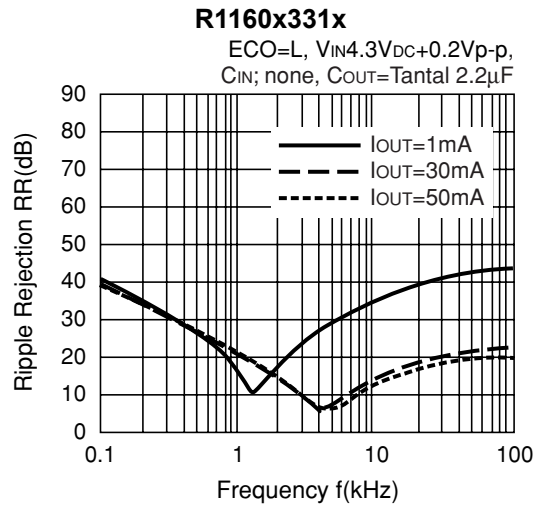
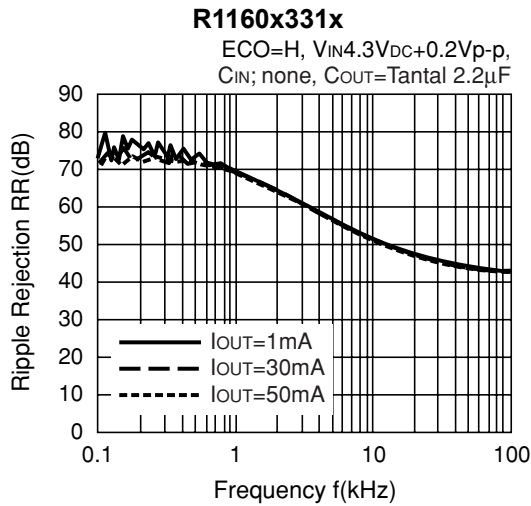
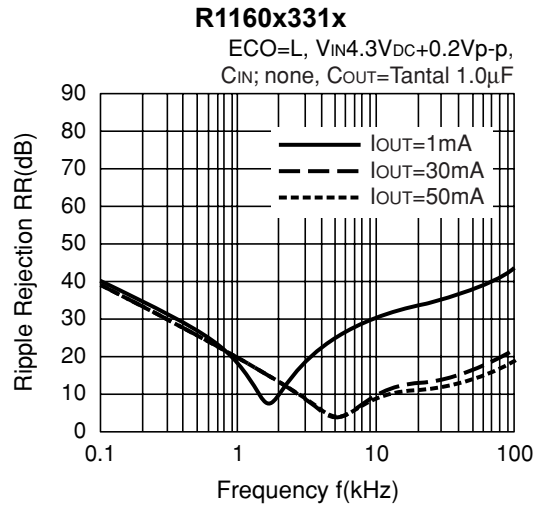
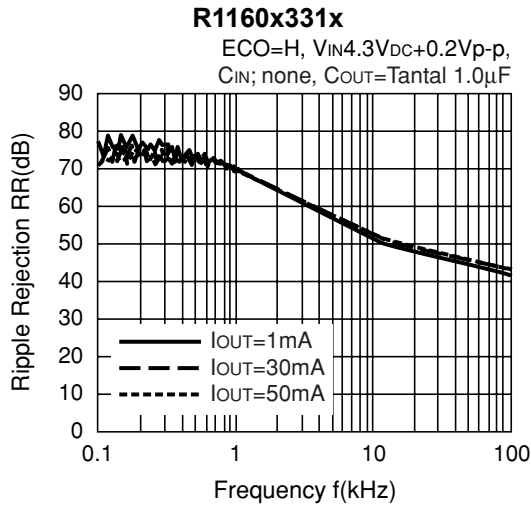




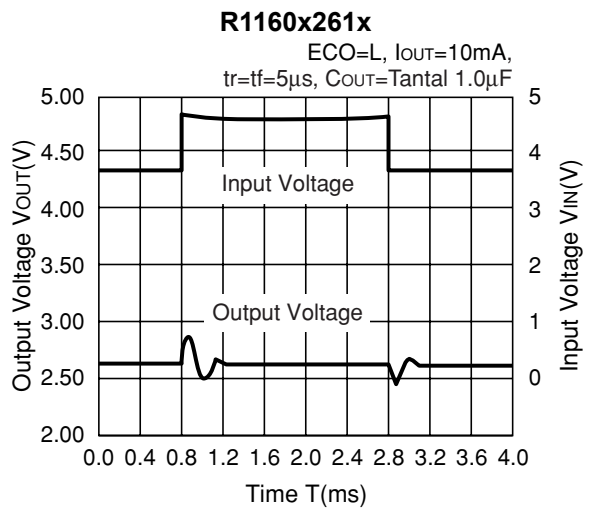
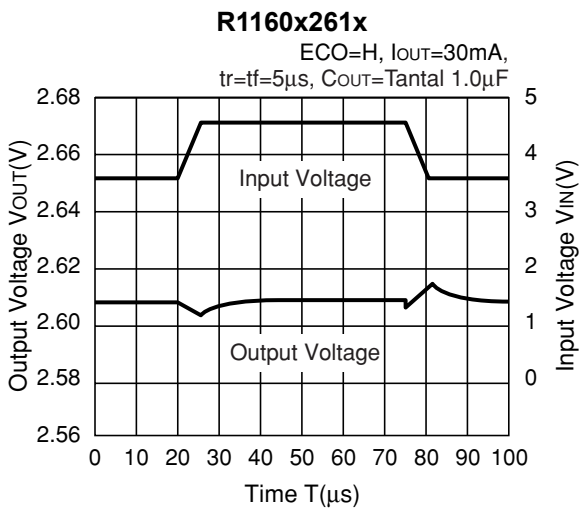
9) Ripple Rejection vs. Frequency



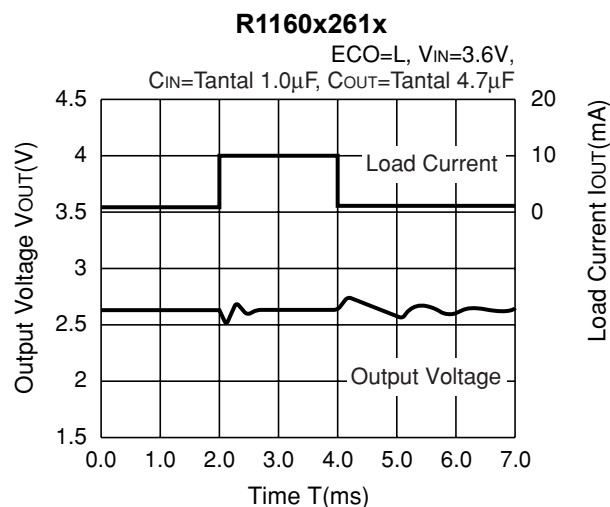
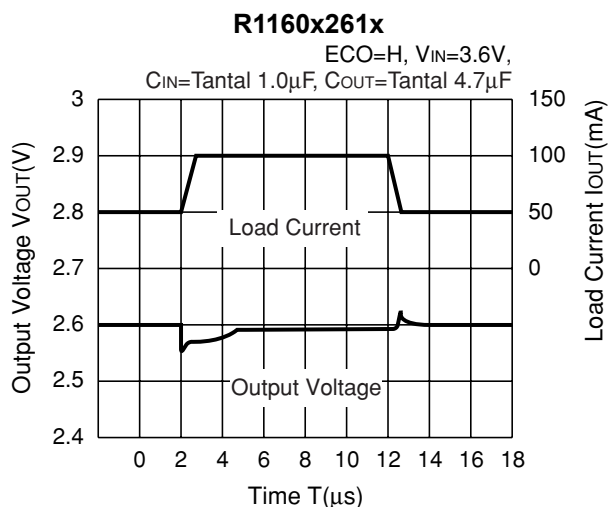
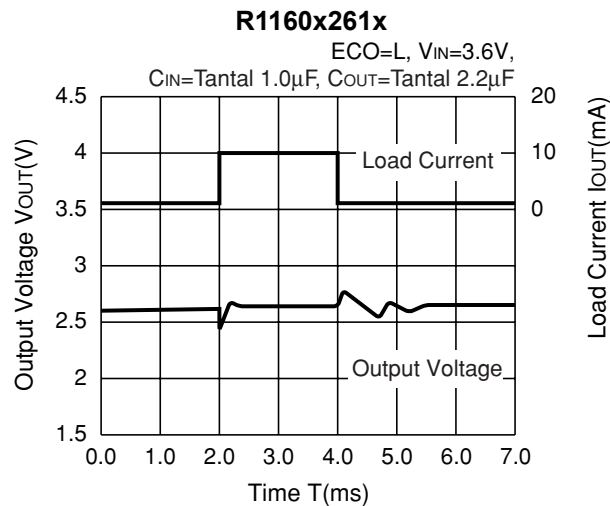
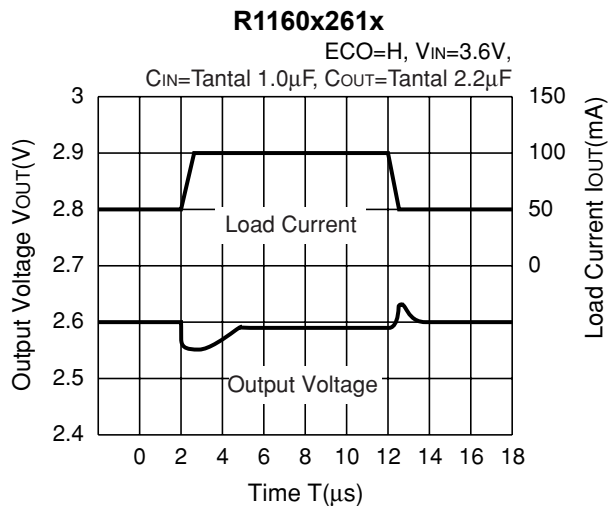
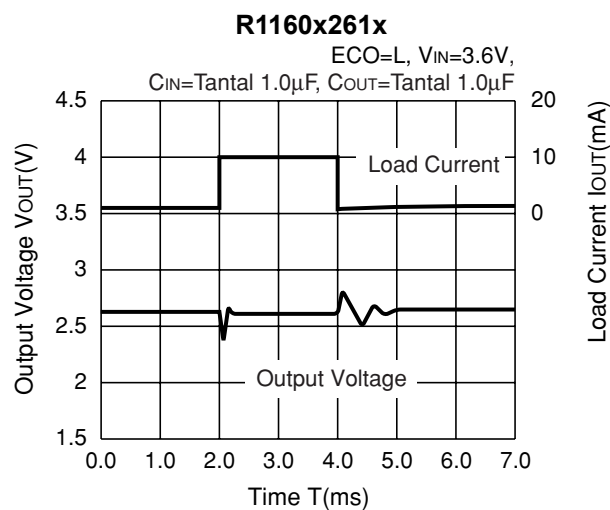
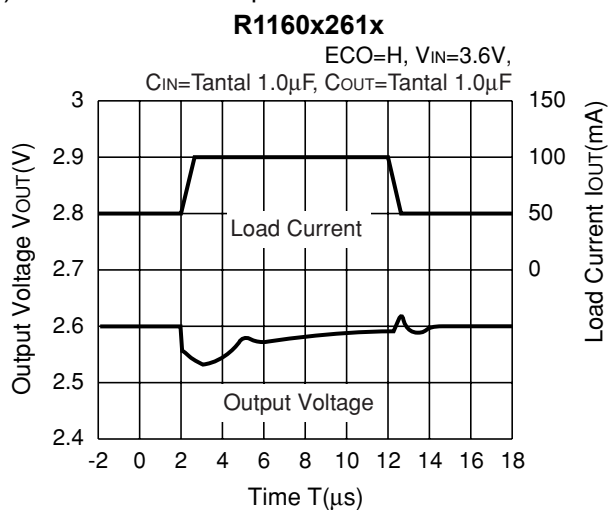




10) Input Transient Response



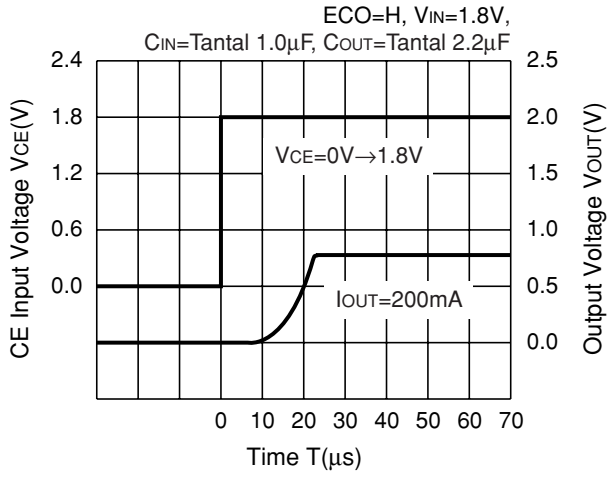
11) Load Transient Response



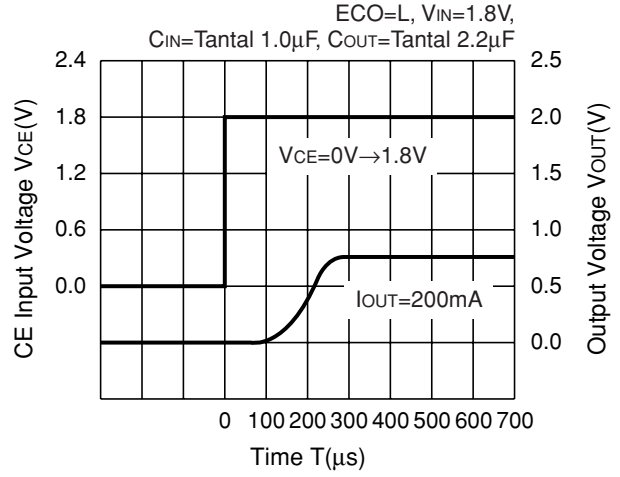
R1160x

12) Turn on speed with CE pin

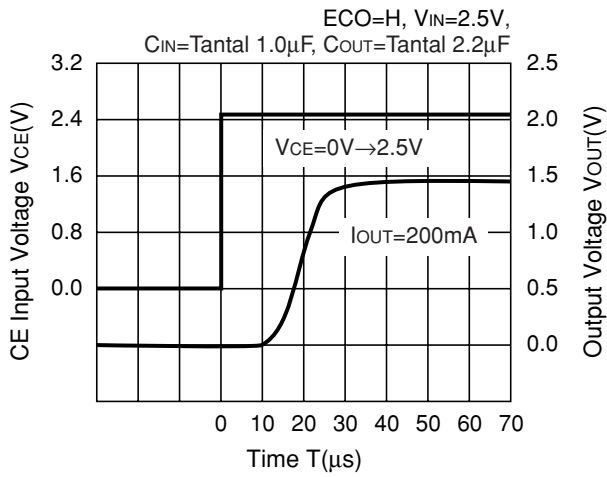
R1160x081B



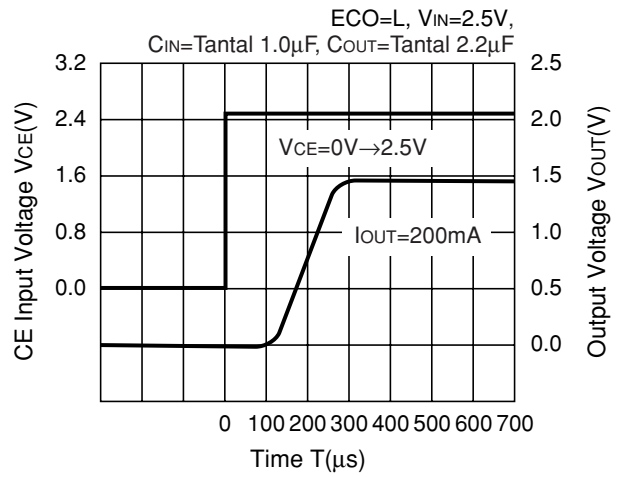
R1160x081B



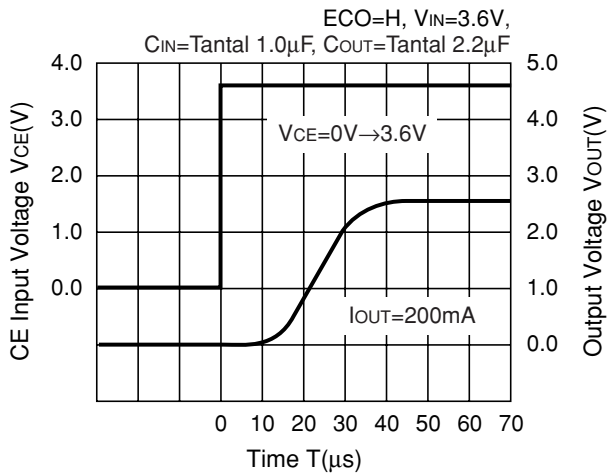
R1160x151B



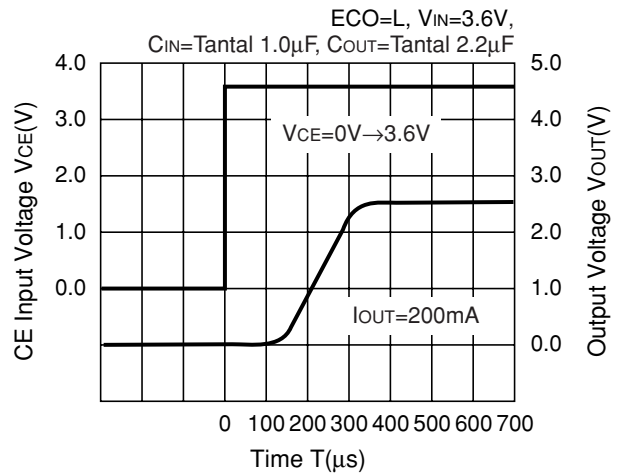
R1160x151B

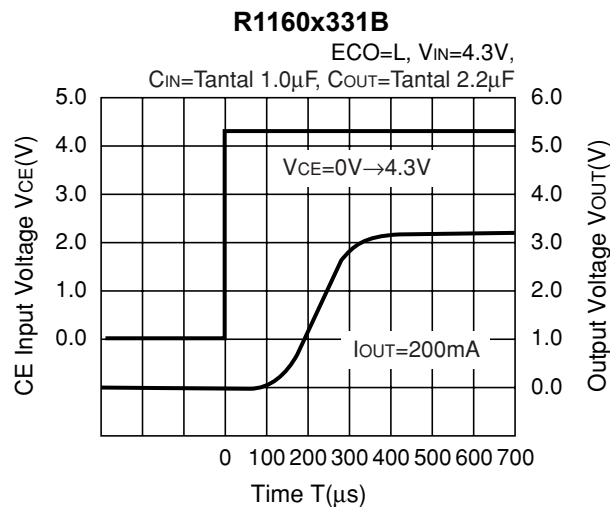
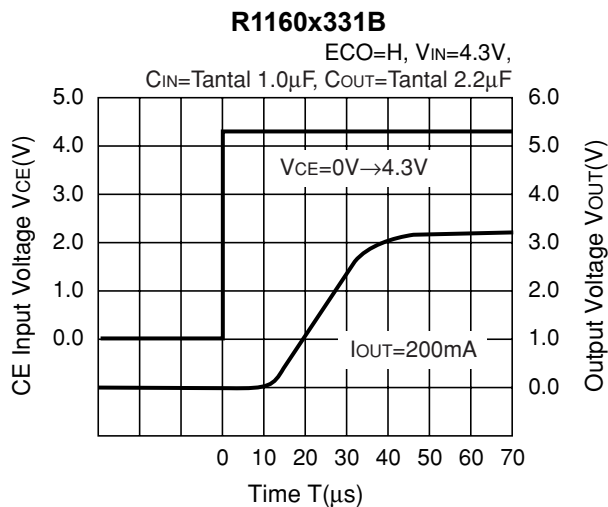


R1160x261B

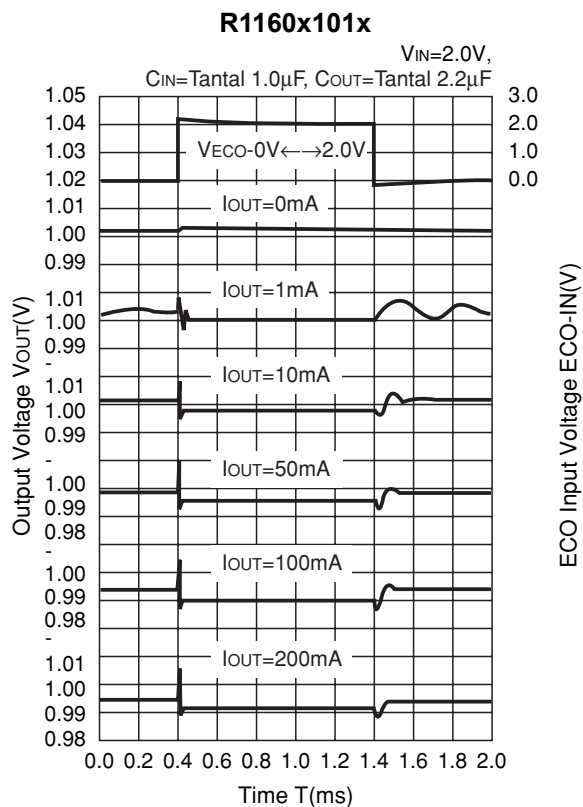
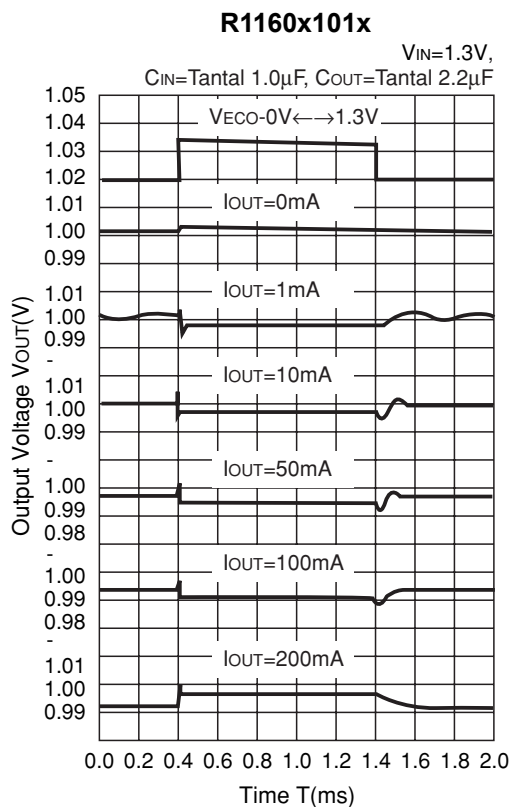


R1160x261B

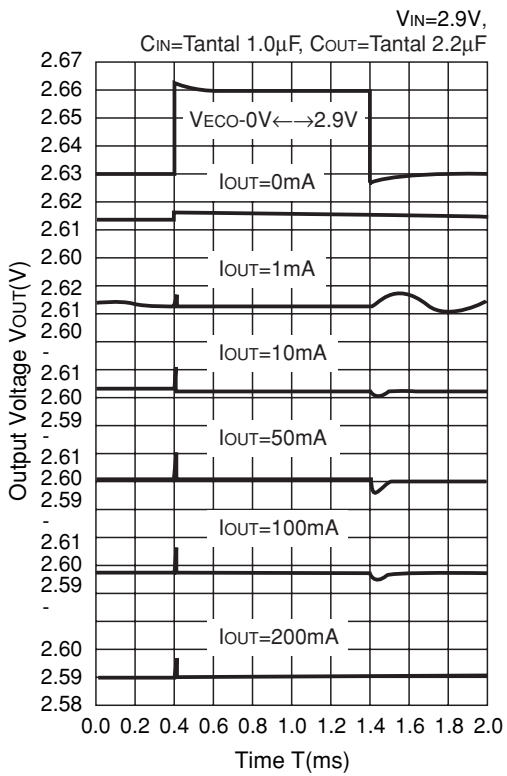




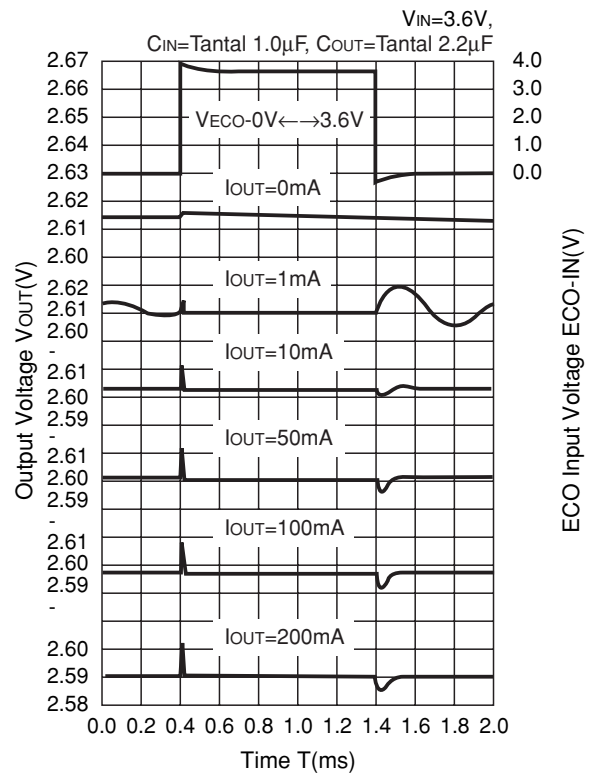
13) Output Voltage at Mode alternative point



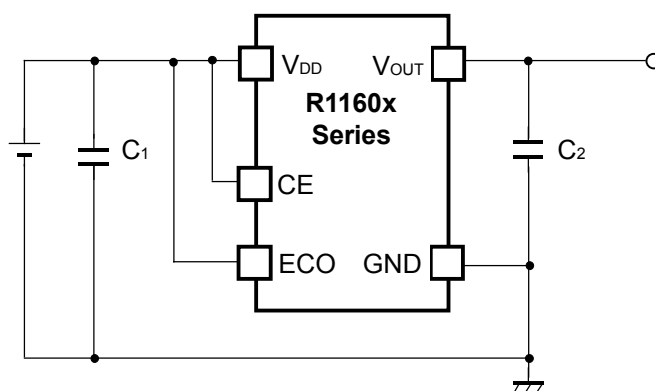
R1160x261x



R1160x261x



TECHNICAL NOTES



(External Components)

C₂: Ceramic 1.0 μ F Output Capacitor Ceramic 1.0 μ F Ex. Murata GRM155B30J105KE18B
Kyocera CM05X5R105K06AB

C₁: Ceramic 1.0 μ F

When using these ICs, consider the following points:

1. Mounting on PCB

Make V_{DD} and GND lines sufficient. If their impedance is high, noise pickup or unstable operation may result. Connect a capacitor with a capacitance value as much as 1.0 μ F or more as C₁ between V_{DD} and GND pin, and as close as possible to the pins.

Set external components, especially the output capacitor, as close as possible to the ICs, and make wiring as short as possible.

2. Phase Compensation

In these ICs, phase compensation is made for securing stable operation even if the output current is varied. For this purpose, be sure to use a 2.2 μ F or more capacitor C_{OUT} with good frequency characteristics and ESR (Equivalent Series Resistance).

(Note: When the additional ceramic capacitors are connected to the Output Pin with Output capacitor for phase compensation, the operation might be unstable. Because of this, test these ICs with as same external components as ones to be used on the PCB.)

If you use a tantalum type capacitor and ESR value of the capacitor is large, output might be unstable. Evaluate your circuit with considering frequency characteristics.

Depending on the capacitor size, manufacturer, and part number, the bias characteristics and temperature characteristics are different. Evaluate the circuit with actual using capacitors.

ESR vs. Output Current

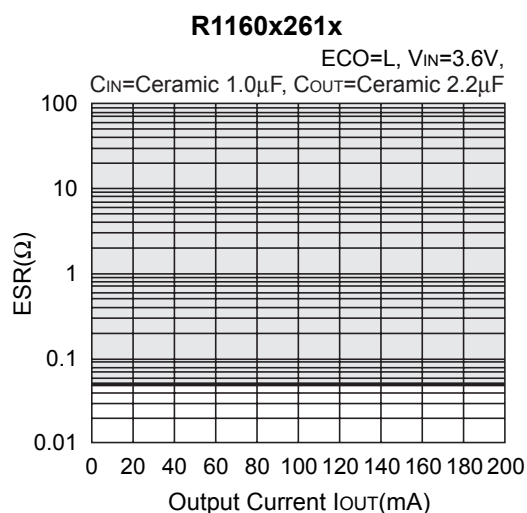
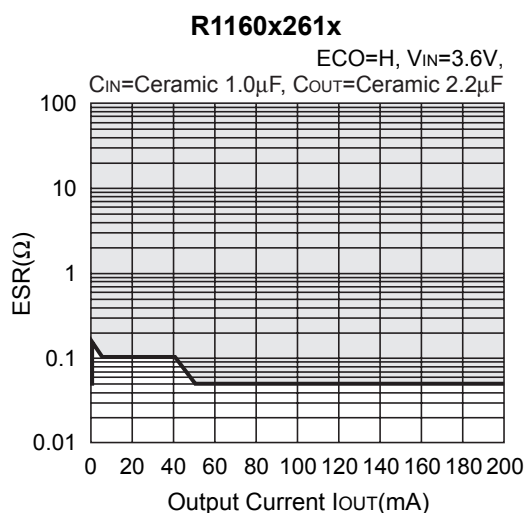
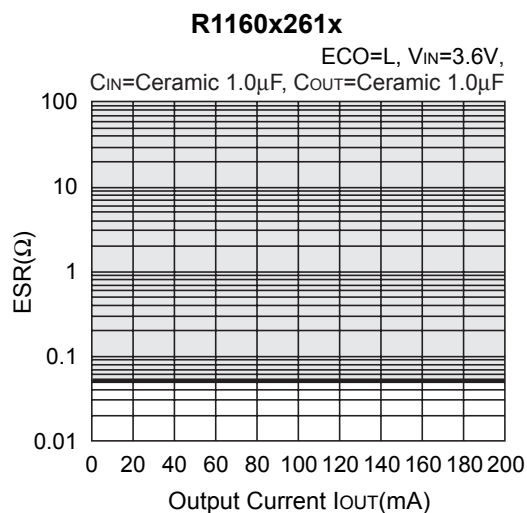
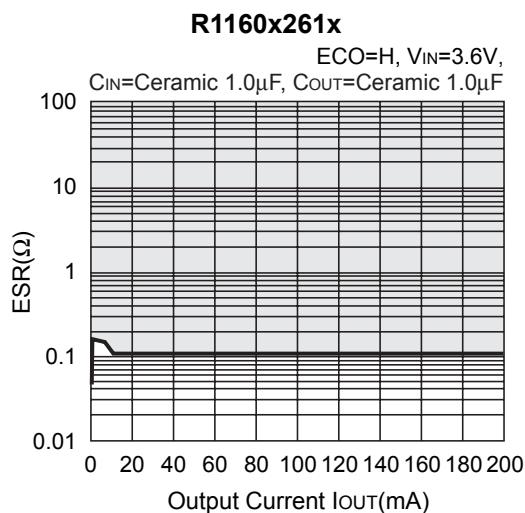
When using these ICs, consider the following points:

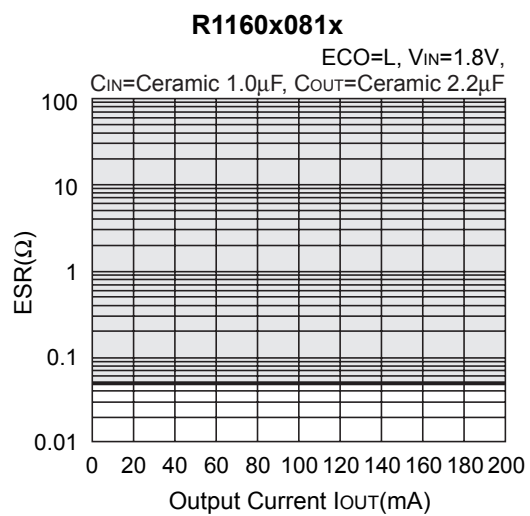
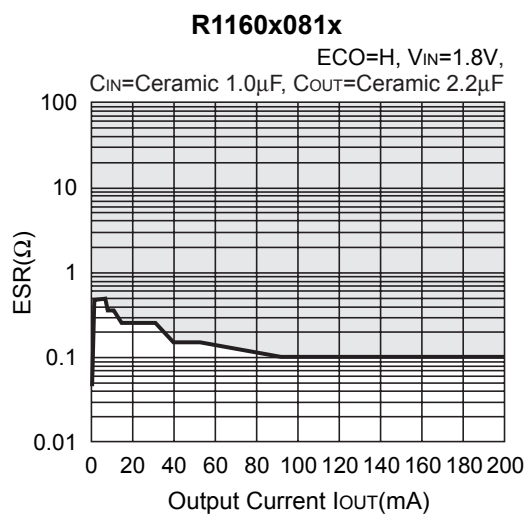
In these ICs, phase compensation is made for securing stable operation even if the Output Current is varied. For this purpose, be sure to use a capacitor C_{OUT} with good frequency characteristics and ESR (Equivalent Series Resistance) in the range described as follows:

The relations between I_{OUT} (Output Current) and ESR of Output Capacitor are shown below. The conditions when the white noise level is under $40\mu\text{V}$ (Avg.) are marked as the hatched area in the graph.

<Test conditions>

- (1) Frequency band: 10Hz to 2MHz
- (2) Temperature: 25°C





POWER DISSIPATION (SOT-23-5)

This specification is at mounted on board. Power Dissipation (P_D) depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

(Power Dissipation (SOT-23-5) is substitution of SOT-23-6.)

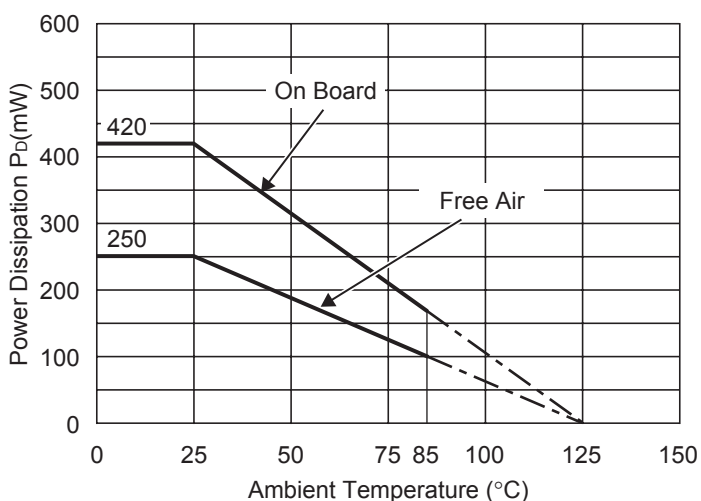
Measurement Conditions

	Standard Land Pattern
Environment	Mounting on Board (Wind velocity=0m/s)
Board Material	Glass cloth epoxy plactic (Double sided)
Board Dimensions	40mm × 40mm × 1.6mm
Copper Ratio	Top side : Approx. 50% , Back side : Approx. 50%
Through-hole	φ0.5mm × 44pcs

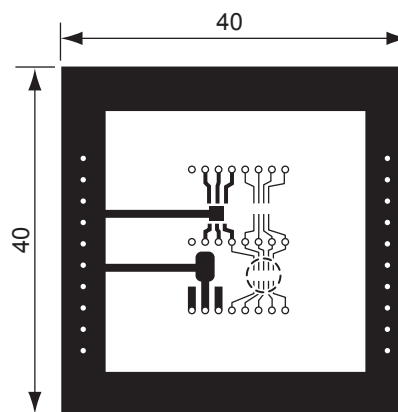
Measurement Result

($T_{opt}=25^{\circ}C, T_{jmax}=125^{\circ}C$)

	Standard Land Pattern	Free Air
Power Dissipation	420mW	250mW
Thermal Resistance	$\theta_{ja}=(125-25^{\circ}C)/0.42W=263^{\circ}C/W$	400 $^{\circ}C/W$



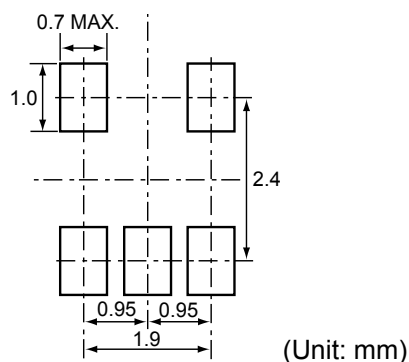
Power Dissipation



Measurement Board Pattern

○ IC Mount Area Unit : mm

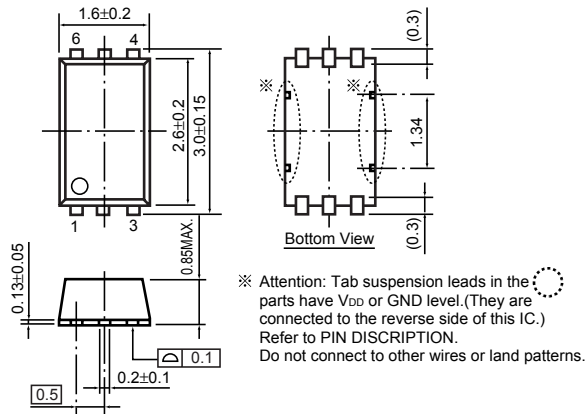
RECOMMENDED LAND PATTERN



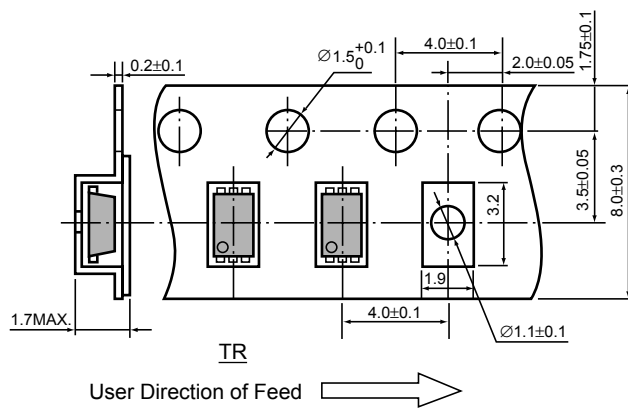
• SON-6

Unit: mm

PACKAGE DIMENSIONS

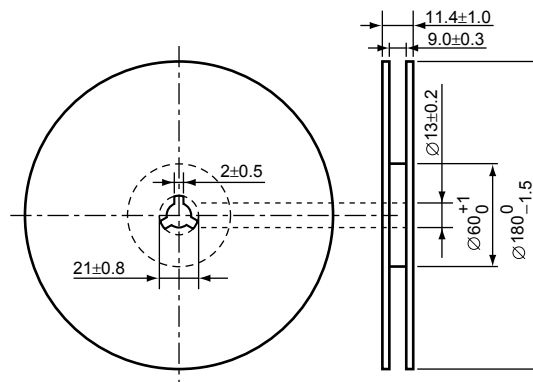


TAPING SPECIFICATION



TAPING REEL DIMENSIONS

(1reel=3000pcs)



POWER DISSIPATION (SON-6)

This specification is at mounted on board. Power Dissipation (P_D) depends on conditions of mounting on board. This specification is based on the measurement at the condition below:

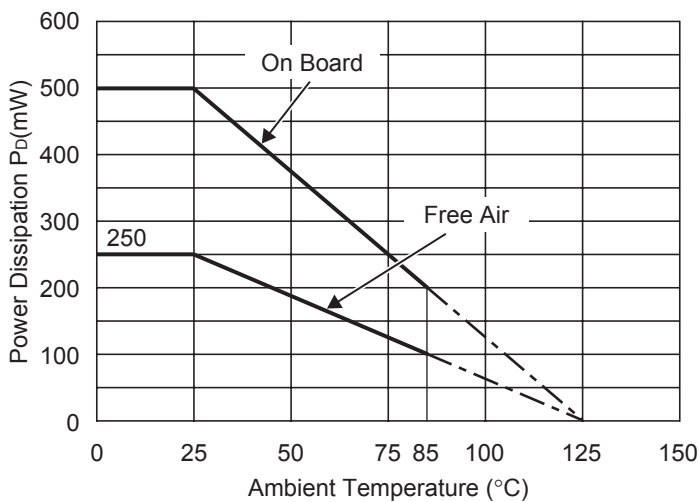
Measurement Conditions

	Standard Land Pattern
Environment	Mounting on Board (Wind velocity=0m/s)
Board Material	Glass cloth epoxy plactic (Double sided)
Board Dimensions	40mm × 40mm × 1.6mm
Copper Ratio	Top side : Approx. 50% , Back side : Approx. 50%
Through-hole	φ0.5mm × 44pcs

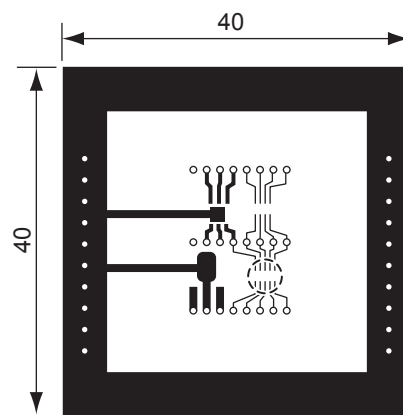
Measurement Result

($T_{opt}=25^{\circ}C, T_{jmax}=125^{\circ}C$)

	Standard Land Pattern	Free Air
Power Dissipation	500mW	250mW
Thermal Resistance	$\theta_{ja}=(125-25^{\circ}C)/0.5W=200^{\circ}C/W$	-



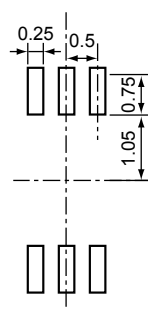
Power Dissipation



Measurement Board Pattern

○ IC Mount Area (Unit : mm)

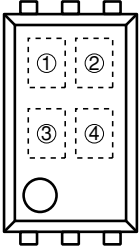
RECOMMENDED LAND PATTERN



(Unit: mm)

R1160D SERIES MARK SPECIFICATION

• SON-6



①, ② : Product Code (refer to Part Number vs. Product Code)

③, ④ : Lot Number

• Part Number vs. Product Code

Part Number	Product Code	
	①	②
R1160D081A	A	8
R1160D091A	A	9
R1160D101A	B	0
R1160D111A	B	1
R1160D121A	B	2
R1160D131A	B	3
R1160D141A	B	4
R1160D151A	B	5
R1160D161A	B	6
R1160D171A	B	7
R1160D181A	B	8
R1160D191A	B	9
R1160D201A	C	0
R1160D211A	C	1
R1160D221A	C	2

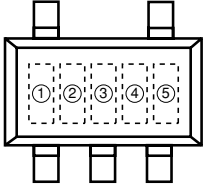
Part Number	Product Code	
	①	②
R1160D231A	C	3
R1160D241A	C	4
R1160D251A	C	5
R1160D261A	C	6
R1160D271A	C	7
R1160D281A	C	8
R1160D291A	C	9
R1160D301A	D	0
R1160D311A	D	1
R1160D321A	D	2
R1160D331A	D	3
R1160D281A5	A	0
R1160D131A5	A	1
R1160D111A5	A	2

Part Number	Product Code	
	①	②
R1160D081B	E	8
R1160D091B	E	9
R1160D101B	F	0
R1160D111B	F	1
R1160D121B	F	2
R1160D131B	F	3
R1160D141B	F	4
R1160D151B	F	5
R1160D161B	F	6
R1160D171B	F	7
R1160D181B	F	8
R1160D191B	F	9
R1160D201B	G	0
R1160D211B	G	1
R1160D221B	G	2

Part Number	Product Code	
	①	②
R1160D231B	G	3
R1160D241B	G	4
R1160D251B	G	5
R1160D261B	G	6
R1160D271B	G	7
R1160D281B	G	8
R1160D291B	G	9
R1160D301B	H	0
R1160D311B	H	1
R1160D321B	H	2
R1160D331B	H	3
R1160D281B5	E	0
R1160D131B5	E	1
R1160D111B5	E	2
R1160D181B5	E	3

R1160N SERIES MARK SPECIFICATION

● SOT-23-5 (SC-74A)



①, ②, ③ : Product Code (refer to Part Number vs. Product Code)

④, ⑤ : Lot Number

● Part Number vs. Product Code

Part Number	Product Code		
	①	②	③
R1160N081A	0	0	8
R1160N091A	0	0	9
R1160N101A	0	1	0
R1160N111A	0	1	1
R1160N121A	0	1	2
R1160N131A	0	1	3
R1160N141A	0	1	4
R1160N151A	0	1	5
R1160N161A	0	1	6
R1160N171A	0	1	7
R1160N181A	0	1	8
R1160N191A	0	1	9
R1160N201A	0	2	0
R1160N211A	0	2	1
R1160N221A	0	2	2

Part Number	Product Code		
	①	②	③
R1160N231A	0	2	3
R1160N241A	0	2	4
R1160N251A	0	2	5
R1160N261A	0	2	6
R1160N271A	0	2	7
R1160N281A	0	2	8
R1160N291A	0	2	9
R1160N301A	0	3	0
R1160N311A	0	3	1
R1160N321A	0	3	2
R1160N331A	0	3	3
R1160N281A5	0	0	0
R1160N131A5	0	0	1
R1160N111A5	0	0	2

Part Number	Product Code		
	①	②	③
R1160N081B	1	0	8
R1160N091B	1	0	9
R1160N101B	1	1	0
R1160N111B	1	1	1
R1160N121B	1	1	2
R1160N131B	1	1	3
R1160N141B	1	1	4
R1160N151B	1	1	5
R1160N161B	1	1	6
R1160N171B	1	1	7
R1160N181B	1	1	8
R1160N191B	1	1	9
R1160N201B	1	2	0
R1160N211B	1	2	1
R1160N221B	1	2	2

Part Number	Product Code		
	①	②	③
R1160N231B	1	2	3
R1160N241B	1	2	4
R1160N251B	1	2	5
R1160N261B	1	2	6
R1160N271B	1	2	7
R1160N281B	1	2	8
R1160N291B	1	2	9
R1160N301B	1	3	0
R1160N311B	1	3	1
R1160N321B	1	3	2
R1160N331B	1	3	3
R1160N281B5	1	0	0
R1160N131B5	1	0	1
R1160N111B5	1	0	2